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(6) # TANK CREW POSITION ASSIGNMENT

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ARI FIELD UNIT AT FORT KNOX, KENTUCKY

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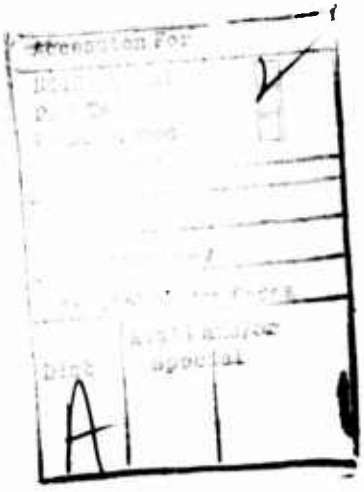

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This research was conducted to determine whether available paper-and-pencil aptitude and training measures could be used to predict tank driver, gunner, and tank commander performance, and if so, to develop appropriate prediction equations based on the aptitude measures.

The research was conducted in three phases. The first two phases were conducted with armor trainees at Fort Knox, and dealt with the gunner and

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driver positions. The third phase was conducted with armor crewmen in operational armor battalions, and dealt with the tank commander and gunner positions. In Phases I and II, at Fort Knox, measures of trainee aptitudes, training performance, driving performance, and main-gun tank gunnery were collected for trainees in the sample. Aptitude measures included the Armed Services Vocational Aptitude Battery (ASVAB) raw scores and additional paper-and-pencil tests, while training measures included performance on tests relating to tank weapons, maintenance, communication, etc. The criterion performances were tank commander ratings of trainee M60 tank driving on a standardized course and number of hits during main-gun tank firing. During Phase III, aptitude and main-gun firing measures were collected for tank commanders and gunners in a sample from a USAREUR armor division. Aptitude measures were based on a battery of paper-and-pencil tests. Gunnery measures were based on performance during tank crew qualification firing at Grafenwohr, West Germany.

With armor trainees at Fort Knox a number of potentially useful predictor variables were identified in Phase I. These included four ASVAB tests and three additional paper-and-pencil tests as gunnery predictors and six ASVAB tests and two additional paper-and-pencil tests as driving predictors. Only one of the driving predictor tests was validated in Phase II, and none of the paper-and-pencil tests was correlated with the gunnery measure. Nevertheless, certain methodological problems entered Phase II, so the failure to validate the other tests did not necessarily indicate a true lack of relationship with criterion performance. In Phase III, conducted with operational units, none of the tank commanders' or gunners' paper-and-pencil test scores was correlated with tank crew qualification gunnery scores.

The results from Phases I and II suggest that the continuing need to make optimal assignments of Army recruits to gunner/loader or driver training may best be addressed by continued research on the paper-and-pencil measures identified in Phase I, as well as the exploration of other techniques such as job sample performance measurement. In continued research with the paper-and-pencil tests, formulas based on both regression-based models and unit-weighted models seem appropriate. The results from Phase III indicate that paper-and-pencil tests do not seem to offer promise of predicting performance of personnel in operational units on tank crew qualification gunnery. Perhaps research efforts could best be directed toward the development and empirical validation of job sample and simulator techniques based on sound task analyses. Such job sample/simulator research might also lead to measures to supplement prediction of gunnery performance for armor trainees.

Technical Report 391

TANK CREW POSITION ASSIGNMENT

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Individual Training

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FOREWORD

A major research area for the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is performance-oriented individual skill development and evaluation. The ARI Field Unit at Fort Knox, Ky., in its work unit area "Crew Position Assignment Methods and Management Factors" (Army Project 2Q763731A770), is concerned with improving methods used to assign personnel to training and service in tank-crew duty positions. The long-range program includes developing and validating predictor tests to improve assignment practices and lead to enhanced tank crew combat proficiency.

The research reported here describes development and initial validation of predictive test batteries for assigning tank crewmen to the positions of tank commander, gunner/loader, and driver based on objective measures of their aptitudes and performance. The subtests were from the Armed Services Vocational Aptitude Battery (ASVAB), other selected paper-and-pencil tests, and interim training performance measures. The research was designed in response to requests by the USA Armor Center (USAARMC) and the USA Armor School (USAARMS).

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TANK CREW POSITION ASSIGNMENT

BRIEF

Objective:

To determine whether available paper-and-pencil aptitude and training measures could be used to predict tank driver, gunner, and tank commander performance, and if so, to develop appropriate prediction equations based on the aptitude measures.

Procedure:

The research was conducted in three phases. In Phase I, which dealt with gunner and driver positions, measures of trainee aptitudes, training performance, driving performance, and main-gun tank gunnery were collected at Fort Knox, Ky., for the 97 armor trainees in the sample. Aptitude measures included the Armed Services Vocational Aptitude Battery (ASVAB) raw scores and additional paper-and-pencil tests; training measures included performance on tests relating to tank weapons, maintenance, communication, etc. The criterion performances were tank commander ratings of trainee M60 tank driving on a standardized course and number of hits during main-gun tank firing.

Phase II was intended to replicate Phase I, using a larger sample. Three armor companies at Fort Knox were involved: 142 trainees participated in driver criterion analysis, and 112 trainees participated in gunnery criterion analysis. Phase II variables were similar to those used in Phase I, but Phase II gave greater emphasis to off-road driver skills.

In Phase III, aptitude and main-gun firing measures were collected for tank commanders and gunners (number of participants varied from 159 to 211) in a sample from a USAREUR armor division. Aptitude measures were based on a battery of paper-and-pencil tests. Gunnery measures were based on performance during tank crew qualification firing at Grafenwohr, West Germany.

Findings:

Phase I resulted in identification of a number of potentially useful predictor variables. These included four ASVAB tests and three additional paper-and-pencil tests as gunnery predictors and six ASVAB tests and two additional paper-and-pencil tests as driving predictors. However, only one of the driving predictor tests was validated in Phase II, and none of the paper-and-pencil tests was correlated with

the gunnery measure. Nevertheless, there were certain differences in research conditions between Phase I and Phase II, so the failure to validate the other tests did not necessarily indicate a true lack of relationship with criteria performance. In Phase III, conducted with operational units, none of the tank commanders' or gunners' paper-and-pencil test scores was correlated with tank crew qualification gunnery scores.

Utilization of Findings:

The results from Phases I and II suggest that the continuing need to make optimal assignments of Army recruits to gunner/loader or driver training may best be addressed by continued research on the paper-and-pencil measures identified in Phase I, as well as the exploration of other techniques such as job sample performance measurement. In continued research with the paper-and-pencil tests, formulas based on regression-based and unit-weighted models seem appropriate. Phase III results indicate that paper-and-pencil tests do not seem to offer promise of predicting performance of personnel in operational units on tank crew qualification gunnery. Future research efforts might best be directed toward the development and empirical validation of job sample and simulator techniques based on sound task analyses. Such job sample/simulator research might also lead to measures that would supplement prediction of gunnery performance for armor trainees.

TANK CREW POSITION ASSIGNMENT

CONTENTS

INTRODUCTION

Recent research has been conducted to identify potential predictors of successful performance in the tank crew positions of Tank Commander, Gunner, and Driver. This research has been responsive to changing needs within the Armor community. Not only are new, more capable, and more sophisticated tanks being introduced into the inventory, but training is becoming more specialized and specific to crew position. Both developments demand methods for identifying individuals who have the best potential for good performance of their assigned crew duties. The general purpose of this research was to determine the potential for assignment of tank crewmen to the positions of tank commander, gunner, and driver based on objective measures of their aptitudes and achievement. The specific rationale and background for each phase of the research reported herein is detailed in sections describing specific phases of the research.

Research toward the development of a prediction battery for identifying Armor trainees for training in a gunner-specific or driver-specific program was first conceptualized in response to recommendations made by the Total Tank System Study (T^2S^2). These recommendations encompassed broad and sweeping changes to the Armor training and assignment system since the T^2S^2 charter gave license for a new look at the entire system. In 1975, T^2S^2 was superseded by the Tank Force Management Group (TFMG), whose similar charter derived from the Chief of Staff, Army rather than the commander of TRADOC.

TFMG, in its recommendations (1977) voiced concern over the state of training in Armor. The group felt that the production of an unspecialized armor crewman with MOS 11E was inadequate in the face of proliferating weapon systems and increasing emphasis on Armor's role on the combined-arms battlefield. The task of the armor crewman, particularly the gunner, was seen to be substantially different for the M60A1 tank with its coincident range finder and unstabilized turret than for the M60A3/XM1 with laser range finders and stabilized turrets. The M551/M60A2, which mount a different main gun with a dual capability for missile launching and conventional round firing, were more different still. And TFMG expressed a reluctance to field the XM1 with the existing training and assignment system, since the full combat potential of the XM1 was unlikely to be achieved.

Specific recommendations involved removing the Armor Crewman from Career Management Field (CMF) 11 and opening up a CMF 19 specifically for Armor. Within CMF 19, drivers, and gunners for the various duty positions and weapon systems, would carry different MOS. For example, the M60A1 driver would carry MOS 19F while the M60A1 gunner would carry MOS 19E. Drivers and gunners for the XM1 would carry MOS 19L and 19K, respectively. The Group recognized that the existing training program was not set up to produce these soldiers. The MOS 11E Basic Armor Training (BAT) program was designed to produce a soldier considered to be a qualified loader, licensed driver, and familiarized gunner. TFMG recommended that the graduate be either a qualified tactical driver or a qualified gunner. In implementation, it was further recommended that assignment should be based on aptitude for driver-specific or gunner-specific training and performance.

In the system envisioned for the M60A1 tank, a soldier in Armor One Station Unit Training (OSUT) would first receive Basic Combat Training (BCT) and Basic Armor Training (BAT). On the completion of BCT and BAT, one third of the trainees would receive driver training, and two thirds of the trainees would receive gunner/loader training. A major question was raised "How can assignment of personnel to MOS 19E/K or 19F/L training best be made?" (Weapon system-specific training within duty position (i.e., separate assignment to 19E or 19K) was not addressed in this research since the Armor Center had not identified separate training programs).

The research reported here addresses some aspects of the question. The research is based directly on that of Greenstein and Hughes (1976) with an Armor AIT (Advanced Individual Training) company, and by Eaton (1978) with a TOE Armor Battalion. Greenstein and Hughes used a battery of aptitude tests, taken from Kaplan (1965) and Thomas and Sternberg (1964), as potential predictors of Armor AIT driving and gunnery performance. In addition, they obtained Armed Forces Qualification Test (AFQT) and Army Classification Battery (ACB) Combat, Field Artillery, and Motor Maintenance Aptitude Area scores for their research participants. They found numerous suggestive relationships between their aptitude measures and driving and gunnery performances. None were of sufficient magnitude, however, to permit their use without further validation. The primary finding of their research was the independence of driving and gunnery measures.

Eaton administered a battery of paper-and-pencil aptitude tests chosen from tests suggested by Kaplan (1965), Thomas and Sternberg (1964), Greenstein and Hughes (1976), and Hughes (1976). He also measured performance on a training simulator (Burst-on-Target Trainer DVC 17-58, DA Pamphlet 310-12), subcaliber firing (Mini-Tank Range Complex, TC 17-12-6), and critical performance component, or "job sample" job tests, such as ranging and gun-laying. Both the paper-and-pencil aptitude measures, and the simulator, subcaliber firing, and job sample measures were then tried as predictors of Table VIII tank gunnery performance and driver performance ratings.

Data analysis provided a potentially useful equation relating gunnery performance to tank commander's scores on four aptitude tests. For gunners and drivers, several individual aptitude tests showed some promise of predictive success. Further, both simulator and job sample measures showed potential for tank commanders and gunners. Because of the relatively small size (less than 40 crewmen in each position) of the sample provided by one battalion, however, the research could best suggest the potential for objective, test-based assignment rather than specifying the specific test battery to be used.

The research reported here was based on the results obtained by Greenstein, Hughes, and Eaton, but the scale of the research was extended to include enough soldiers to allow firmer conclusions. Three phases of the research are reported. Phases I and II dealt with prediction research oriented toward the driver and gunner positions. One company of Armor OSUT (one-station unit training) trainees participated in Phase I and three OSUT companies participated in Phase II. Phase III was very much like Eaton's research in that tank commanders and gunners assigned to tanks in an operational armor division participated in the research. The research conducted in Phase I and II in OSUT did not deal with the tank commander position because OSUT trainees are not trained as tank commanders. Hence, no meaningful measure of tank commander performance could be obtained. The Phase III research did not include the driver position because the performance criterion for Phase III, Table VIII gunnery at Grafenwoehr, Germany, did not provide an objective measure of driver performance.

SPECIFIC OBJECTIVES

The specific objectives of this research were (1) to determine whether aptitude measures thus far identified could be used to predict performance in three tank crew positions, and if so (2) to develop appropriate prediction equations based on the aptitude measures. The details and findings of Phases I, II, and III are described below.

PHASE I

Before research could address the question of how to best assign personnel to tank driver or gunner/loader training, two initial considerations needed to be addressed. First, at what point in a man's progression from Reception Station to completion of training would the assignment decision be made? And second, what data would be available at that point on which to base an assignment decision?

To expedite the research program an initial assumption was made following the advice of the Armor School. It was assumed that the assignment decision could be made either prior to BCT, or following BCT and BAT. This assumption permitted several data options. If the CMF change were approved, DCSPER-DA would need validity data on which to base a selector for CMF 19. This validity data would have to be based largely on the Armed Services Vocational Aptitude Battery (ASVAB). Thus, collecting ASVAB test scores would provide test score/Aptitude Area data to validate against performance in training. A post-BCT/BAT assignment decision would permit supplemental testing of potential Armor crewman at the Reception Station or during BCT/BAT if instruments could be found that added to the validity of the ASVAB against driving or gunnery training success. Finally, performance measures from BCT/BAT would also be available and could be used if they added to the validities obtained from the ASVAB and the supplemental tests.

METHOD

Research Participants.

Research participants were 11E (armor crewman) trainees in one Armor OSUT company at Ft Knox, Kentucky. Training took place between November 1976 and February 1977. There were 97 trainees with complete data sets included in the data analysis.

Instrument Selection.

A list of measures for use in this research was drawn up in conjunction with representatives of the Armor Training Center and the Armor School. These measures are listed below, by source.

ASVAB. All sixteen test scores from the ASVAB were obtained, including those tests that are part of Aptitude Area CO, the selector for CMF 11. These tests are:

General Information
Numerical Operations
Attention to Detail (part of CO)
Word Knowledge
Arithmetic Reasoning (part of CO)
Space Perception (part of CO)
Mathematical Knowledge
Electronics Information
Mechanical Comprehension
General Science
Shop Information (part of CO)
Automotive Information
Classification Inventory - Maintenance Scale
Classification Inventory - Attentiveness Scale
Classification Inventory - Electronics Scale
Classification Inventory - Combat Scale (part of CO)

Supplemental Tests. Seven tests were selected based on prior ARI research.

Lateral Perception (PT 5088). A 50 item timed test. Each item consists of two rows of from 1 to 10 alphabetic and/or keyboard

characters each. The two rows comprising each item are presented side by side with different degrees of left-right separation between rows. The examinee is required to examine the two rows of characters and respond on a separate answer sheet either "same" or "different". Score is number of items correct.

Visual Recognition (PT 5089). A forty item timed test in which the examinee is required to match a geometrical design given on the left with one of five geometrical designs given on the right. Score is number of items correct.

Visual Memory (PT 5087). A twenty item timed test in which the examinee is first required to commit to memory each design in a matrix of 20 different geometrical designs. The examinee is then, in the absence of the matrix, required to view 20 rows each containing designs similar to those viewed in the matrix. In each row the examinee is required to choose the design which was presented in the matrix. Score is number of items correct.

Locations (PT 2852). A 48 item timed visual test consisting of sets of four small photographs, each set being accompanied by a large photograph having five lettered locations marked. The examinee is required to identify the lettered location in the large photograph from which each of the four small photographs were taken. Six of the 12 sets of four small photographs are darkened to give a "night" effect. Score is number of items correct.

Speed of Perception (PT 5086). A timed test in which the examinee is required to locate in succession the numbers from 1-50 where alternate numbers vary in size and where each is presented in a random location on one side of a standard 8.5 by 11 inch sheet of paper. Score is highest number reached.

Simulated Zeroing. A test (constructed by ARI - Ft Knox) to determine the extent to which the subject is able to locate the geometric center of a hypothetical three round shot group. Score is measured based on deviation of perceived center from the true center.

Object Completion (PT 2853). A timed test requiring the examinee to identify a set of partially obscured line drawings of military objects such as field glasses, canteen etc. Score is correct number of figures identified.

OSUT Measures.

Personal Preference. A single item eliciting preference for assignment as a gunner or a driver. This item was administered three times; on entrance to OSUT, after basic driving, and after preliminary gunnery. (Because of incomplete data, only the first administration was used in the analysis.)

Performance on the M34 Driving Simulator. Initial driving instruction is given on the M34 Driving Simulator. This instruction covers such areas as starting and stopping procedures, use of the light box, hand and arm signals, and night flashlight signals. A checklist was developed for use with the M34 (Appendix A). Trainees were tested

on the M34 twice; on completion of M34 training by the unit cadre and by Brigade testing personnel as a part of the midcycle test. In both cases, the checklist was used to measure performance. The first testing was used in the analysis. The Brigade tests were not used in the analysis because there was essentially no variance across the trainees.

Performance on the Midcycle Test. Three of the stations on the midcycle test were used in this research. This test was administered and scored by Brigade testing personnel.

Maintenance. There are three performance measures on the maintenance station; measuring track tension, checking and servicing of air cleaners, and extracting data from a lubrication order including demonstrating where and how to lube or check selected items. Score was number of performance measures rated "go".

Communications. There are five performance measures on the communications station; (1) placing the CVC helmet into operation and correctly using the three-position communication switch, (2) placing the AM-1780 audio amplifier into operation, (3) placing the RT-841 radio transmitter into operation, (4) performing a radio check using an AN/VRC-64 radio, and (5) transmitting a prepared message using an AN/VRC-64 radio and using proper radio-telephone procedures. Score was number of performance measures rated "go".

Weapons. There are four performance measures on the weapons station; (1) clearing the caliber .45 pistol, (2) disassembly/assembly/function check on the caliber .45 pistol, (3) clearing the M3A1 SMG,

and (4) disassembly/assembly/function check on the M3A1 SMG. Score was number of performance measures rated "go".

Caliber .45 Pistol Qualification. There was some feeling in the Fort Knox Armor community that similar skills may be involved in the various types of "gunnery", i.e., caliber .45 pistol, M16 rifle, and tank gunnery. To check on this possibility, scores obtained by the trainees during caliber .45 pistol qualification were included in the research.

Reaction Time. Popular legend has it that reaction time is a factor in both driving and gunnery. The reaction time measures obtained as part of the Motor Vehicle Driver Battery II were included to check on this possibility.

Criteria for Driving and Gunnery.

Driving. At the time of this research--indeed, at the time of this writing--no universally accepted criterion existed for tactical tank driving. No measuring device existed that was considered a valid indicator. An attempt was made, as part of this research, to begin the development of a tactical driving course and a performance checklist covering the salient tasks in tactical driving. Personnel from the 1st Brigade at Ft Knox, in conjunction with ARI, developed a tactical driving course specifically for use in this research. It was hoped that this driving course would provide useful measures of driving performance.

The driving course checklist of Greenstein and Hughes (1976) was helpful in the development of a checklist for the advanced driving course used in this research. Their checklist did not cover as many driving tasks as were incorporated into the scenario for this research, but did serve as a useful beginning for the panel of NCO driving instructors who developed the list of items for the course. This list was reduced to checklist and verified by a second panel of NCO driving instructors. The final driving checklist is at Appendix B. In general, the driving course followed the checklist, and included starting and stopping procedures, driver compartment equipment operation, driving following hand signals, on-road driving, and terrain driving.

In addition to the checklist, a form was developed on which the examining tank commander could rank the trainees he tested into four groups; the best drivers in the group, above average for the group but not the best drivers, below average for the group but not the poorest drivers, and the poorest drivers in the group. This was done in hopes of avoiding one of the problems associated with GO/NO-GO checklists—the small number of "NO-GOs" usually obtained. It was not used in the analysis, however, because most examining tank commanders were loath to rank anyone below average. Despite the instructions printed on the form itself and half-hour training session, most of the trainees were ranked above average. The ranking form is at Appendix C.

Gunnery. The Armor OSUT course of instruction current at the time of the research included practice firing on Tank Tables I-V. These firing exercises are outlined in Table 1.

In discussions with the Armor Center and the Armor School, it was determined that this normal sequence was inadequate for measuring gunnery performance for this research. It was felt that more main gun engagements would be needed since the agreed-upon gunnery criterion would be target hits at various ranges against both moving and stationary targets. A modified Tank Table VI was developed by the Armor School to serve as a gunnery criterion for the research. The table consisted of 14 main gun rounds fired from a stationary tank. There were 6 exercises: two 3-round Burst on Target* exercises (where incorrect ranges were purposely indexed) against stationary targets, two standard engagements against stationary targets, and two against moving targets. A more complete description of this Table is included in Appendix D.

*Burst on Target refers to a method of adjusting the sight picture for a second round based on the location of the "burst" of the first round. For example, if the first round "burst" low and to the right of the target, the second round would be aimed higher and to the left of the first round aiming point.

Table 1

SUMMARY OF TANK TABLE I-V, ARMOR OSUT

Table	Firing Device	Firing Platform	Target	Number of Rounds
I	Laser	(Boresight and Zero Exercise)		
II	Laser	Stationary	Stationary	
III	Laser	Stationary	Moving	
IV Modified	Main Gun	Stationary	Stationary	2
V Modified	Main Gun	Stationary	Moving	4
	Coaxial MG	Stationary		150

Procedure.

ASVAB scores were collected by Brigade representatives from the Reception Station records. ARI paper and pencil tests were administered and scored by ARI personnel. OSUT measures were obtained by Brigade representatives during the course of normal OSUT training. The driver criterion measures were scored by Brigade Tank Commanders on the tactical driving course. The gunnery measures were collected by ARI personnel placed on scoring platforms equipped with BC scopes and tank-to-platform intercom equipment, during the Table VI main gun firing exercise.

RESULTS

Data Handling.

ASVAB scores were obtained directly from the Ft Knox Reception Station. ARI tests were hand-scored and tabulated as were OSUT measures provided by the 1st Brigade. Driver checklist and gunnery scores were standardized to eliminate rater/scorer variance. The mean and standard deviation of the raw scores were computed separately for each rater or scorer, and were used to compute standard scores having a mean of 20 and a standard deviation of 5. Means and standard deviations for each variable, as well as variable intercorrelations, are presented in Appendix E.

Data Analysis.

Data were analyzed in the following manner. First ASVAB variables alone were related to driver and gunnery criterion variables, using standard forward-test-selection stepwise multiple regression techniques. This was done because ASVAB scores are readily available for trainees entering Armor OSUT and, if useful in performance prediction, could be used without the need for any further testing. Second, ASVAB plus ARI variables were evaluated in the same way. Third, all ASVAB, ARI, and OSUT variables were evaluated in the same way. In all analyses the F-to-enter was set at 2.76, representing a p of approximately .10. Finally, all predictors with significant positive correlations with performance criteria were identified. All paper and pencil tests having significant positive correlations with driver performance were entered into a unit-weighted predictor. This was accomplished by standardizing scores for each significant variable, and summing the standardized variables for each subject to form the driving predictor. A similar procedure was used to form a unit-weighted gunnery predictor.

Predictions of Driving Criterion Performance.

ASVAB Results. Six ASVAB variables were chosen in the driving criterion variable analysis: Automotive Information, Classification Inventory - Electronics Scale, General Information, Numerical Operations. Shop Information, and Classification Inventory - Attentiveness Scale. These six tests yielded a multiple R of .527, $F = 5.75$, $p < .001$. A summary table of these results is shown in Table 2.

ASVAB Plus ARI Variable Results. The best two ASVAB variables, Automotive Information and Classification Inventory - Electronics Scale, were forced in this analysis first with other ASVAB and ARI variables entering afterwards in a forward stepwise multiple regression analysis. The results indicated five tests, three--Automotive Information, Classification Inventory - Electronics Scale, and Classification Inventory - Attentiveness Scale from ASVAB, and Lateral Perception and Locations from ARI variables. The multiple R was .526, $F = 6.95$, $p < .001$. These results are shown in Table 3.

ASVAB, ARI, and OSUT Variable Results. When the best four ASVAB and ARI variables, Automotive Information, Classification Inventory - Electronics Scale, Lateral Perception, and Classification Inventory - Attentiveness Scale, were forced first into the analysis of ASVAB, ARI, and OSUT variables, none of the OSUT variables was selected by the analysis to enter into the prediction equation.

Table 2

ASVAB VS DRIVING CRITERION MULTIPLE REGRESSION SUMMARY TABLE - PHASE I

Variable Entered	Partial F	B	Multiple R	Simple R	Overall F	Significance
Automotive Information	18.666	.563	.337	.337	12.186	.001
Classification Inventory (Elect)	9.733	.373	.399	.263	8.912	.000
General Information	4.876	-.399	.432	-.033	7.133	.000
Numerical Operations	7.645	.132	.465	.169	6.346	.000
Shop Information	5.342	-.286	.497	.066	5.960	.000
Classification Inventory (Attent)	3.784	-.355	.527	.039	5.749	.000
	C = 17.467					

Table 3

ASVAB PLUS ARI VS DRIVING CRITERION MULTIPLE REGRESSION SUMMARY TABLE - PHASE I

Variable Entered	Partial F	B	Multiple R	Simple R	Overall F	Significance
Automotive Information	12.301	.385	.337	.337		
Classification Inventory (Elect)	8.613	.344	.399	.263	8.912	.000
Lateral Perception	8.922	.154	.467	.285	8.657	.000
Classification Inventory (Attent)	3.810	-.345	.498	.039	7.575	.000
Locations	3.582	-.165	.526	-.102	6.947	.000
	C = 14.412					

Predictor Variables with Significant Zero Order Correlations.

Eight ASVAB, ARI, or OSUT variables had significant positive (1 tail, $p < .05$) correlations with the driving criterion. These are shown in Table 4. The unit weighted model provided a predictor composed of ASVAB-only tests included Numerical Operations, Arithmetic Reasoning, Electronics Information, Automotive Information, and Classification Inventory-Electronics Scale. This composite had a correlation of .396 with driving performance, and .111 with gunnery performance. The unit weighted composite with all significant paper and pencil variables included Lateral Perception and Visual Memory with the tests listed above. This predictor had a correlation of .205 with driving, and .124 with gunnery performance.

Predictions of Gunnery Criterion Performance.

ASVAB Results. Two ASVAB variables were chosen: Mechanical Comprehension and Classification Inventory - Combat Scale. These two tests yielded a multiple R of .303, $F = 4.75$, $p = .011$. These results are shown in the summary table in Table 5.

ASVAB Plus ARI Variable Results. The best two ASVAB variables, Mechanical Comprehension and Classification Inventory - Combat Scale were forced in this forward stepwise multiple regression analysis, with all other ASVAB and all ARI variables entering afterwards. Four additional variables were chosen, two ASVAB variables and two ARI variables. These were Mathematical Knowledge, Electronics Information, Lateral Perception, and Visual Recognition. They yielded a multiple R of .459, $F = 4.01$, $p = .001$. These results are shown in the summary table in Table 6.

ASVAB, ARI, and OSUT Variable Results. When the best six ASVAB and ARI variables, listed above, were forced first into this analysis, only one OSUT measure was chosen: Midcycle communications. The multiple $R = .496$, $F = 4.139$, $p = .001$.

Table 4

VARIABLES WITH SIGNIFICANT POSITIVE (1-TAIL P < .05) CORRELATIONS WITH DRIVING PERFORMANCE

	r
Numerical Operations	.17
Arithmetic Reasoning	.21
Electronics Information	.18
Automotive Information	.34
Classification Inventory - Electronics Scale	.26
Lateral Perception	.29
Visual Memory	.17
.45 Cal Pistol	.18

Table 5

ASVAB VS GUNNERY CRITERION MULTIPLE REGRESSION SUMMARY TABLE - PHASE I

Variable Entered	Partial F	B	Multiple R	Simple R	Overall F	Significance
Mechanical Comprehension	7.224	.325	.247	.247	6.148	.015
Classification Inventory (Combat)	3.216	-.198	.303	-.149	4.754	.011
		C = 19.888				

Table 6

ASVAB PLUS ARI VS GUNNERY CRITERION MULTIPLE REGRESSION SUMMARY TABLE - PHASE I

Variable Entered	Partial F	B	Multiple R	Simple R	Overall F	Significance
Mechanical Comprehension	7.483	.356	.247	.247		
Classification Inventory (Combat)	4.012	-.218	.303	-.149	4.754	.011
Visual Recognition	7.187	.178	.359	.206	4.573	.005
Lateral Perception	4.658	-.119	.399	-.081	4.345	.003
Mathematics Knowledge	4.356	.269	.431	.182	4.163	.002
Electronics Information	2.819	-.215	.459	.007	4.008	.001
		C = 19.992				

Predictor Variables with Significant Zero Order Correlations. Six ASVAB, ARI, or OSUT variables had significant positive (1 tail, $p < .05$) correlations with the gunnery criterion. These are shown in Table 7. The unit weighted model provided a predictor comprised of ASVAB-only tests including Word Knowledge, Mathematics Knowledge, and Mechanical Comprehension. This composite had a correlation of .291 with gunnery and .180 with driving performance. The unit weighted model with all significant paper and pencil variables included Visual Recognition, Visual Memory, and Object Completion with the tests listed above. This predictor had a correlation of .328 with gunnery, and .150 with driving.

Personal Preference. Although Personal Preference was never chosen as a variable in the previous analyses, it was possible that the interaction of preference with variable value would relate to the criterion variables. To evaluate this possibility preference interaction values were computed for all ARI, ASVAB, and OSUT variables by multiplying their variable scores by +1, if they indicated a preference for gunnery, and -1 if they indicated a preference for driving. A standard forward stepwise multiple regression analysis was run, with the best ASVAB and ARI variables forced first into the analysis.

1. Driver criterion variable. The best four ASVAB and ARI variables forced into the analysis were Automotive Information, Classification Inventory - Electronics Scale, Classification Inventory - Attentiveness Scale, and Lateral Perception. No preference interaction terms added to these four.

2. Gunnery Criterion variable. The best six ASVAB and ARI variables forced into the analysis were Mathematics Knowledge, Visual

Table 7

VARIABLES WITH SIGNIFICANT POSITIVE (1-TAIL $p < .05$) CORRELATIONS WITH GUNNERY PERFORMANCE

	r
Word Knowledge	.20
Mathematics Knowledge	.18
Mechanical Comprehension	.25
Visual Recognition	.21
Visual Memory	.22
Object Completion	.21

Recognition, Classification Inventory - Combat Scale, Mechanical Comprehension, Lateral Perception, and Electronics Information. Two preference interaction terms entered the analysis, Numerical Operations (PNUMOPS), and Arithmetic Reasoning (PARTHRS). The multiple R = .569, F = 5.24, p = .001. The results are shown in Table 8.

DISCUSSION

In this phase data was collected on ASVAB, ARI, and OSUT performance variables as potential predictors of either OSUT driving or gunnery performance for trainees in one OSUT company. Multiple regression analyses were conducted first with ASVAB predictors, the most readily available for prediction purposes. Next, analyses were done with ASVAB plus ARI paper and pencil tests as the next most accessible information for prediction purposes, and then with ASVAB, plus ARI, plus OSUT variables, as least easily acquired data for prediction purposes. Finally, for each criterion, a unit weighted predictor was developed by summing the standardized scores for variables which had a positive correlation with the criterion. This was done with ASVAB variables only, and with ASVAB plus ARI variables.

The results indicated an apparently acceptable level of driver performance prediction using a regression-based combination of six ASVAB variables. In the sample studied these six accounted for approximately 28% of variance in driver performance. A relationship of that magnitude would be quite useful for prediction purposes, if replicable. Neither the addition of ARI or OSUT measures to ASVAB provided an increase in prediction. Thus, from this sample, it would seem that ASVAB scores alone may be used as predictors of driver performance. Results with the unit weighted composite followed this pattern, with better prediction from ASVAB alone than ASVAB plus ARI tests.

Table 8

ASVAB PLUS ARI PLUS PERSONNEL PREFERENCE VS GUNNERY CRITERION MULTIPLE REGRESSION SUMMARY TABLE - PHASE I

Variable Entered	Partial F	B	Multiple R	Simple R	Overall F	Significance
Mathematics Knowledge	6.663	.316	.182	.182		
Visual Recognition	9.896	.199	.264	.206		
Classification Inventory (Combat)	7.313	-.279	.337	-.149		
Mechanical Comprehension	5.116	.369	.388	.247		
Lateral Perception	4.977	-.116	.431	-.081		
Electronics Information	3.988	-.244	.459	.007	4.008	.001
PNUMOPS	14.435	.140	.486	.194	3.937	.001
PARTHRS	11.178	-.292	.567	.095	5.236	.000
		C = 20.376				

Gunnery results indicated only a moderate relationship between ASVAB scores alone and the gunnery measure. With the multiple regression techniques the addition of ARI paper-and-pencil test scores to ASVAB markedly improved the degree of prediction, accounting for 21% of the variation in gunnery scores. The addition of OSUT measures did nothing to improve the level of prediction. Thus, for this sample it would appear that ASVAB alone is insufficient to predict gunnery performance, but that ASVAB plus ARI measures provide an acceptable level of prediction. Results with the unit weighted composites followed the same pattern, with ASVAB plus ARI variables providing slightly better prediction than ASVAB variables only.

The finding of Phase I results of the research must be interpreted with caution because they are not replicates of results from earlier OSUT studies. Only with the gunnery findings for ARI paper-and-pencil tests did we have an opportunity to see whether the findings for Lateral Perception and Visual Recognition tests are supported by the research conducted previously by Greenstein and Hughes (1976). In that research no relationship was found for Lateral Perception, and a small negative relationship, opposite the direction noted with this research, was found for Visual Recognition.

The following research, reported in Phase II, represented an effort to determine whether the results of Phase I could be replicated with a sample of three OSUT companies.

PHASE II

Phase II was in most respects a replication of Phase I using three OSUT companies. The purpose was to determine whether the promising results from the single OSUT company observed in Phase I would recur in a second, larger sample. If so, good predictors would be available for assignment of personnel to driver or gunner/loader training in Armor OSUT as per TFMG recommendations.

METHOD

Research Participants.

Research participants were trainees in three OSUT companies beginning training in May 1977 and completing training in July 1977. Because of the relatively small size of the OSUT companies, and relative incompleteness of the data available, 142 trainee data sets were available for driver criterion analysis, and 112 trainee data sets were available for gunnery criterion analysis. All trainees also participated in a concurrent tryout of new night driving exercises conducted by the Armor Center.

Instruments and Criterion Variables.

The same ASVAB, ARI and OSUT variables used in Phase I were used again in this phase of the research. Criterion variables were similar to those used in Phase I. The Phase II course, however, gave greater emphasis to off-road driving skills. Again, a driving course was used and trainees were evaluated on their cross-country driving performance by their tank commanders. Trainees were scored "GO" or "NO-GO" on a number of driving performance measures, and then provided with an

overall driving rating. A checklist showing the types of behaviors sampled is provided in Appendix F.

Gunnery performance was evaluated by collecting Tank Table VI (Modified) hit/miss data for all trainees. The Table VI(M) used in Phase II differed from that in Phase I, in that there were more moving targets, more targets overall, and longer ranges. Performance on nine standardized engagements was recorded by NCOs assigned to a scoring detail like that used in Phase I. A sample scoresheet, showing all engagement types and ranges is shown in Appendix G.

Procedure.

ASVAB scores were collected by Brigade representatives from the Reception Station records. ARI paper-and-pencil tests were administered and scored by Brigade personnel. OSUT measures were obtained by Brigade representatives during the course of normal OSUT training. The driver criterion measures were scored by Brigade Tank Commanders on the driving course. Gunnery measures were collected by 11E NCOs assigned to scoring platforms equipped with BC scopes and tank-to-platform intercom equipment. The NCOs were BCT drill sergeants at the time of the study, but all had prior experience as tank commanders in at least one gunnery season.

To provide an indication of scoring reliability a senior 11E NCO assigned to ARI (and who had served as a gunnery scorer in Phase I) used binoculars to independently score several individuals along with each of the members of the scoring team. Scores obtained by the scoring team were correlated with those obtained by the senior NCO to estimate inter-rater reliability.

RESULTS

Data Handling.

All ASVAB and AR1 and OSUT data was handled as in Phase I. Criterion data, however, was handled differently. Driving checklist scores were negatively skewed and reflected substantial company differences. Unfortunately, evaluator identification was not available so evaluator differences are unknown. The negative hypergeometric distribution was fit to the data of each company to remove company differences and normalize distributions.

The means and standard deviations of each company were used to estimate parameters of the negative hypergeometric distribution (Lord and Novick, 1970). For each company, chi-square goodness of fit tests were not significant as shown in Table 9. Estimates of the percentiles corresponding to the scores in each company were obtained from the fitted distribution and used to assign standardized scores corresponding to the centiles of a normal distribution with $\mu = 500$, $\sigma = 100$.

Driving rating score distributions were not skewed but again reflected company differences. Driver ratings were standardized by company, therefore, into "T" scores (having a mean of 50 and standard deviation of 10).

Finally, a driver composite standard score was completed by multiplying driver rating standard score by 10, adding the product to the driver checklist standard score (which had a mean of 500 and a standard deviation of 100), and dividing the sum by two. This driver composite standard score was the driver criterion used in analyses of driver performance.

Table 9

TESTS OF GOODNESS OF FIT TO HYPERGEOMETRIC DISTRIBUTIONS - PHASE II

Company	Driver Checklist df	Driver Checklist x^2	Table VI Hits df	Table VI Hits x^2
A	5	1.12	8	8.77
B	6	5.89	8	10.72
C	6	4.76	7	6.70

Scorer	Table VI Hits df	Table VI Hits x^2
1	6	2.19
2	8	3.86
3	6	10.17
4	7	5.54
5	8	19.16*

* $p < .05$

Gunnery scores were derived from number-of-hits data on 15 rounds fired on Table VI (mod). Data was omitted for one moving target round (engagement 1, Battlesight, 700m) that had a consistent negative relationship with other rounds. The coefficients presented in Table 10 indicate that the hit data is moderately reliable, whether interrater or internal consistency forms of reliability are examined. The split-half coefficients suggest that unit and scorer variance does not substantially inflate the overall reliability estimates, since the coefficients within units and scores are not much lower than the value based on the whole sample.

Hit data was processed in two ways. Standardized scores were computed to remove company and scorer differences, yielding "T" scores (with mean 50 and standard deviation 10). Due to the positively skewed distribution of the number-of-hits data the Lord and Novick negative hypergeometric transformation technique was also used.

In the latter case, parameters of the negative hypergeometrics were estimated from the marginal weighted means of the two-way company x grader table, and by assuming that the variances of the distributions were proportional to the means. The constant of proportionality was estimated from the regression of σ^2 on M, assuming the regression line passed through the origin. Thus, only 9 parameters were estimated to fit 15 distributions. Goodness of fit tests were nonsignificant, except for one scorer, as indicated by the chi-square tests shown in Table 9. For Scorer 5, the number of zero scores exceeded expectation. Since one deviant cell out of forty is not improbable, the overall goodness of fit was judged adequate for the purpose of transformation. The resulting standardized and transformed scores were very highly intercorrelated ($r = .93$). Transformed scores were used as the gunnery criterion for all analyses reported in the results section.

Table 10

RELIABILITY OF MAIN GUN HITS - PHASE II

	r_{xx}	n
Interrater	.744	34
Cronbach Alpha	.573	249
Guttman Split-Half	.738	249
Guttman Split-Half by Unit		
Unit 1	.733	82
Unit 2	.786	71
Unit 3	.676	96
Guttman Split-Half by Scorer		
Scorer 1	.637	46
Scorer 2	.637	41
Scorer 3	.750	54
Scorer 4	.543	55
Scorer 5	.865	53

Correlations between the gunnery and driving criteria are presented in Table 11. All of the correlations were very small, and none were statistically significant. These findings indicate that gunnery and driving performance are entirely unrelated, in agreement with the findings of previous studies.

Data Analyses.

Predictor and criterion variable means, standard deviations, and intercorrelations were computed separately for the 142 trainees included in the driver analyses, and the 112 men in the gunnery analyses. They are shown in Appendix H.

Regression analyses were conducted as in Phase I. Standard stepwise multiple regression analyses were utilized with F-to-enter corresponding to $p = .10$ ($F = 2.78$) and tolerance = .10 in all analyses. As in Phase I ASVAB variables were analyzed alone first, then with ARI variables, and last with ARI and OSUT variables. Because of the very few variables having significant correlations with criterion variables, no unit weighted composites were evaluated.

Driving Criterion Results. The analysis of ASVAB variables yielded only one test--Automotive Information, $r = .188$, $F = 5.128$, $p = .025$. The addition of either ARI or ARI plus OSUT variables failed to indicate any further tests as predictors of driving performance. No other ARI, ASVAB, or OSUT variables were significantly correlated with performance.

Gunnery Criterion Results. The analyses of the ASVAB variables indicated only one test, Attention to Detail, as a predictor of gunnery performance, $r = .264$, $F = 8.223$, $p = .005$. When ARI variables were added only Simulated Zeroing was added to Attention to Detail, yielding

Table 11

CORRELATIONS AMONG CRITERION SCORES

	Gunnery Scores	
Driving Scores	Transformed	Standardized
Transformed Checklist	.005	.009
Standardized Rating	.024	.049
Composite	.016	.032

n = 185

an R = .352, F = 7.70, p = .001 (r = .202, $p < .01$). These results are shown in Table 12. The addition of OSUT measures did not add any predictor variables. No other ASVAB, ARI, or OSUT variables were significantly correlated with performance.

Table 12

ASVAB PLUS ARI VS GUNNERY CRITERION MULTIPLE REGRESSION GUNNERY TABLE - PHASE II

Variable Entered	Partial F	B	Multiple R	Simple R	Overall F	Significance
Attention to Detail	10.331	7.730	.264	.264	8.223	.005
Simulated Zeroing	6.744	5.340	.352	.202	7.698	.001
	C = 39.529					

DISCUSSION

The results of the Phase II analyses were not nearly so encouraging as those from Phase I. Particularly distressing were driver results. The Phase I results indicated a combination of five potentially predictive variables from the ASVAB and ARI measures, and a total of eight variables significantly correlated with performance. In Phase II, however, only Automotive Information, the first variable selected in Phase I, was chosen. While this should suggest the robustness of that variable it also poses the question of lack of correspondence between the two analyses. The most obvious answer is that in the Phase I driver criterion rater variance was removed, because the driver checklist scores were standardized using a mean and standard deviation computed separately for each rater. In the Phase II analyses, however, the rater's identity was unknown, so the scores could not be standardized separately. Thus, in part the analyses found the best possible predictor of trainee performance, plus rater bias, given the data provided. Of course, it is unlikely that it would be possible to predict rater bias from knowledge of trainee aptitude measures, so random error was inflated by rater bias.

With gunnery measures two variables were chosen: Attention to Detail from ASVAB, and Simulated Zeroing from the ARI variables. These accounted for a modest (12%) amount of the gunnery performance variance in the sample analyzed. Neither of these variables, however, was among those in the Phase I analyses identified in the multiple regression equation, or among the variables in Phase I which were significantly correlated with gunnery performance.

In the case of gunnery, no easily-observed major discrepency exists between the Phase I and Phase II procedures or criterion data, although there were some differences in the Table VI procedure used in Phase II. The Phase II Table VI was more heavily weighted with longer range targets, and moving targets because it was judged desirable to weight the selection more heavily in the direction of abilities required to handle more difficult targets. However, this difference is a matter of degree, and should not have resulted in a total lack of correspondence between the two phases.

An investigation of the conduct of Phases I and II suggests that Phase II was not a replication of Phase I. Phase II was intended to be a replicate of Phase I but resources were not available at ARI-Ft Knox when the Armor Center presented the troop units for participation. Consequently, the Armor Center collected Phase II data. In addition, participation in night driving, concomitant with gunnery training, may have indirectly affected the prediction of gunnery scores. The driver training required rearrangement of normal gunnery training schedules and some loss of training time. Also, adverse effects on the alertness of both instructors and trainees were observed in gunnery classes. Consequently, enough is known about the conduct of Phase II to suggest that the difference in results from Phase I is a direct consequence of a difference in research conditions. Phases I and II were similar only on the surface.

PHASE III

Phase III, unlike Phase I and II, dealt with armor crewmen in TOE units, and focussed on gunnery alone rather than both driving and gunnery. The intent of the research was twofold. The first intent was to determine to what extent tests given by ARI to OSUT trainees in Phase I and II were predictive of the performance of armor crewmen in TOE units. Because of limited driving measurement opportunities only gunnery performance was evaluated. The second intent was to determine to what extent previous research relating armor crewmen test and gunnery performance (Eaton, 1978) would be supported by data from a substantially larger sample. Most notable of Eaton's findings was a strong ($r = +.49$, $p < .01$, 2-tailed) relationship between tank commander's Object Completion test scores and precision gunnery hits on stationary targets. Another relationship of interest for tank commanders was that between precision gunnery hits on stationary targets and Patterns and Mechanical Abilities tests (r's = +.30 and +.31, respectively, $p < .10$). While no relationships with hits were found for gunners, their Attention-to-Detail and Lateral Perception test scores were significantly correlated with opening time on battlesight engagements against stationary targets (r's = -.34 and +.34, respectively, p's $< .05$, 2-tailed).

METHOD

Research Participants.

Research participants were gunners and tank commanders in five M60A1 battalions in a USAREUR armor division. Of the approximately 250 crewmen in each position who were potentially available, complete data sets were available

for 159-211, depending upon the analysis required. Data were collected between May and September 1977.

Instruments and Criterion Variables.

Predictor variables were similar to the ARI variables utilized in Phases I and II. The only additions were ARI PT 3129, Mechanical Abilities; ARI PT 4489, Attention to Detail (similar to the ASVAB Attention to Detail); and ARI PT 2788, Patterns. There were no deletions. The three additional instruments were described by Hughes (1976) as follows:

Mechanical Abilities (PT 3129). This 50-item test is a measure of knowledge about general mechanics (Part I-30 items) and tool function (Part II-20 items). The statements about general mechanics are for the most part information-type items about automotive and other mechanical objects. In Part II, pictures and tools are presented and the examinee identifies their use.

Attention to Detail (PT 4489). This is a 60-item four minute hand scored perceptual speed test of the "C-Cancellation" type. The examinee is required to count the C's in a row of O's.

Patterns (PT 2788(R)). The examinee is required to reproduce on an answer sheet a line pattern which conforms to a pattern presented in a different part of the answer sheet.

Most crewman had entered the Army more than two years prior to the initiation of the research, a time when the ASVAB was not given. Consequently, ASVAB scores were not available for use as predictor variables. Futher, due to resource restraints, collection of job sample or simulator data was not possible.

Criterion variables were based on performance on Table VIII, the Tank Crew Qualification Course, at Grafenwohr, Germany. Table VIII consisted of two phases--day and night. During both the day and night phases there were four multiple-target engagements as shown in Table 13. Gunnery criterion measures are described in detail in the results section.

Procedure.

Crewmen were first administered the ARI predictor instruments, then tracked to Grafenwoehr during their normal gunnery qualification firing of Table VIII, and their Table VIII scores obtained. The predictor instruments were administered by an ARI team to gunners and tank commanders in their home battalion classrooms. This testing occurred approximately two months prior to Table VIII at Grafenwoehr. Because of relatively high crew turbulence in this two-month period, make-up testing was conducted at Grafenwoehr in unused mess halls or offices.

Criterion data collected on Table VIII were opening time on each engagement and hit/miss data for each main gun round. To help insure completeness and accuracy of Table VIII hit and time data three sources were used. First was data taken from the records maintained by each battalion. These were obtained at Grafenwoehr during the battalion firing. Second was data collected by a member of a data collection team during the tank crew's debriefing conducted after Table VIII. Data collection team members were enlisted men detailed by the battalion

Table 13

TABLE VIII TANK CREW QUALIFICATION COURSE - PHASE III

DAY ENGAGEMENT	WEAPONS SYSTEM	TARGET
1	.50 cal machinegun	Stationary BRDM
	Coax machinegun	Stationary troops
2	Main gun	Moving tank
		Stationary tank
3	Main gun	Stationary tank
	Main gun	Stationary tank
	.50 cal	BRDM
4	Main gun	Stationary tank
	Main gun	Stationary tank
	Main gun	Stationary tank

NIGHT ENGAGEMENT	WEAPONS SYSTEM	TARGET
1	Main gun (range card)	Stationary tank
2	Main gun (range card)	Stationary tank
3	.50 cal machinegun	Stationary BRDM
	Coax machinegun	Stationary troops
4	Main gun	Moving tank
	Main gun	Stationary tank

to assist ARI representatives in data collection. A data collection team member was present during each debriefing to acquire immediate hit/coverage/time data from the scorer (usually a platoon leader) and obtain answers to any questions about the conduct of the Table (misfires, targets which did not "pop-up", etc.). The third source was a tape-recording of each Table VIII run. The tape recordings included crew intercom communication, firing-tank to control-tank communication, and tower-to-tank communication. To make the recordings a data collection team member connected a cassette recorder to the firing tank's audio-frequency amplifier (AM 1780/VRC). Recordings were used to verify time measurements, answer questions about any unusual circumstances such as misfires, nonappearance of targets, etc., and to resolve any discrepancies between data collected in debriefings and data taken from battalion score sheets.

RESULTS

Data Handling - Predictor Variables.

All ARI predictor tests were scored as in Phases I and II and tabulated separately for gunners and tank commanders. Means and standard deviations of predictor variables are shown in Appendix I for gunners and for tank commanders. Also provided in Appendix I are intercorrelation matrices for gunner predictor variables and for tank commander predictor variables.

Because predictor tests were given to some crewmen at their home station, and to others at Grafenwoehr, the possibility existed that significant differences in test scores may have occurred due to different

testing conditions. Each of the ten tests for gunners and tank commanders were evaluated separately using t-tests. Because of the large number of t-tests conducted, and the large df (197-209), an alpha-level of .01 was chosen. There were no significant differences between home station and Grafenwoehr scores on any of the predictor tests for gunners and tank commanders (all $t \leq 2.39$, all $p \geq .01$).

Data Handling - Criterion Variables.

Gunnery hit/miss, and opening time raw scores were tabulated for each tank and cross-checked to insure accuracy by using battalion scoresheets, debriefing scoresheets, and the tape recordings. From these the following summary variables were computed for each tank:

Summary Variable

1. Mean main gun opening time - day.
2. Mean main gun opening time - night.
3. Mean main gun opening time - day and night.
4. Total first round main gun hits - day.
5. Total first round main gun hits - night.
6. Total first round main gun hits - day and night.
7. Total main gun targets destroyed - day.
8. Total main gun targets destroyed - night.
9. Total main gun targets destroyed - day and night.

Because Table VIII gunnery was conducted by each of the five battalions according to slightly different procedures the possibility existed that

battalions would exhibit significant differences on the summary gunnery variables above, necessitating use of standardized rather than summary gunnery variables in ensuing analyses. Accordingly, nine ANOVAs were conducted to determine whether significant between-battalion differences existed. Again an alpha-level of .01 was chosen. Six of the nine analyses (variables 1-4, 6, and 7) yielded significant results. Because of the between battalion differences, intercorrelation matrices for the nine summary variables were computed overall, and separately by battalion for use in choosing final gunnery criteria. These are provided in Appendix J.

The intercorrelations indicated that the relationship between day and night performance was rather weak for each measure. Day and night performance was significantly correlated for opening time ($r = 261$, $p = .001$) and total targets destroyed ($r = .197$, $p - .002$) and not for first round hits ($r = .070$, $p = .158$) but the correlations were not large in any case. Since day and night gunnery are considered to be equally important from an operational standpoint, composite measures based on both conditions were judged to be the most valid indicators of performance despite their heterogeneity. Therefore, because of their overall importance, mean opening time (variable 3) and total main gun targets destroyed (variable 9) were chosen as the bases for the gunnery criterion measures. To eliminate between-battalion differences indicated by the ANOVAs, standardized time and hit scores were computed for each tank in each battalion. These were used as criteria for all subsequent analyses.

Predictor-Criterion Realtionships.

Zero-order correlations were computed between each predictor variable and standardized hit and time measures for both tank commanders and gunners. These correlations are shown in Table 14 ($159 \leq N \leq 211$, depending on variables). None of the zero order correlations reached statistical significance (all $p > .10$). Stepwise multiple regression analyses of predictor variables on criterion variables for both gunners and tank commanders confirmed that there was no significant relation between predictor and criterion variables.

Simular results were obtained when the correlations were computed separately for day and night scores. Only very small correlations of Lateral perception with TC Day opening time ($r = -.174$, $p < .01$) and Gunner Day total targets destroyed ($r = -.174$, $p < .01$) were significant. Neither of these correlations were consistent with previous results.

DISCUSSION

The purposes of this research were twofold. The first was to determine whether predictor-criterion relationships from OSUT trainees would obtain with TOE crewmen. The second was to determine whether predictor-criterion relationships from Ft Carson research with TOE crewmen (Eaton, 1977) would obtain with a larger sample of USAREUR TOE crewmen.

The overall lack of significant relationships between gunner's predictor variables and main gun hits revealed with USAREUR TOE crewmen in Phase III would tend to confirm the similar negative findings revealed with Phase II, and further disconfirm the encouraging findings of Phase I.

Table 14

CORRELATIONS BETWEEN PREDICTOR VARIABLES AND STANDARDIZED HIT AND TIME MEASURES FOR TCs AND GRs
PHASE III

	Criterion Variable			
	GRs		TCs	
Predictor Variable	Hits	Time	Hits	Time
Simulated Zeroing	+.073	-.036	-.084	-.070
Visual Memory	-.058	-.063	-.034	-.059
Speed of Perception	-.043	+.004	+.073	-.054
Patterns	+.009	-.007	+.048	+.015
Attention to Detail	-.125	+.069	+.022	-.143
Object Completion	-.041	-.118	+.072	+.019
Locations	-.069	-.154	-.037	-.012
Mechanical Abilities	+.067	-.144	+.023	+.082
Lateral Perception Span	-.041	-.043	+.091	-.076
Visual Recognition	+.009	-.010	+.061	-.080
	all p > .10			

Gunner's hit results from USAREUR and Ft Carson are unpromising. No relationships were obtained in the Ft Carson results, and the one significant correlation obtained in USAREUR is too small to be useful. It was somewhat surprising, however, that neither of the significant Ft Carson relationships between the opening time criterion and Attention to Detail (+.34) or Lateral Perception (-.34) were confirmed. There was no support to suggest that either of these relationships obtains under the conditions of the USAREUR research.

Similarly, it was surprising that there was no support from the USAREUR results for the Ft Carson tank commander findings. None of the Ft Carson relationships between the main gun hit criterion and Object Completion (+.49), Patterns (+.30) or Mechanical Abilities (+.31) received any confirmation.

It would seem that Phase III research provides no support to the notion that tank gunnery performance may be predicted by the paper-and-pencil aptitude tests selected for use in this research. Of course, many objections could be leveled at the predictor variable collection methodology. The tests were administered in battalion classrooms, unused mess halls, etc., rather than a test center. In addition, crewmen may not have been motivated when taking the tests, they may not have understood the instructions, they may have been tired, etc. While any or all of these post-hoc explanations may have some validity, it remains true that the tests were given to a rather large sample of armor crewmen, from five separate battalions, under relatively normal operating conditions. Tests which were not sufficiently robust to prove useful in such environments would probably be of limited use for application in operational units, regardless of their validity in pristine laboratory environments.

The same type of arguments could be addressed to the Table VIII data collection methodology. No gun-cameras were available, counting holes in targets was impossible with the many hard-targets at Grafenwoehr, etc. Nevertheless, the best data collection methodology procedures available were used, (intercom tapes, crew debriefings by scorer, and battalion records). Although the day-to-night hit and time correlations were small, this may be more indicative of different skill requirements rather than measurement unreliability. Finally, Table VIII score, as collected by the battalion (without the benefit of intercom tapes or crew debriefing records) is the Army's stated standard for crew gunnery qualification. I would seem, therefore, that criticisms of the gunnery data collection extend to the operational situation as well.

In correlation research of the type conducted in Phase III, three primary factors can account for a failure to obtain significant predictor-criterion relationships. The first is inadequate predictor variable measurement; the second is inadequate criterion variable measurement; and the third is negligible predictor-criterion relationships under the circumstances, and in the environment, in which the data were collected. It is apparent that the third alternative is the most probable for accounting for the results obtained in Phase III.

GENERAL DISCUSSION AND CONCLUSIONS

The purpose of this research was to determine whether aptitude/achievement measures thus far identified could be used to predict performance of tank commanders, gunners, and drivers, and if so, to develop appropriate prediction equations based on the aptitude measures.

The research was conducted in three phases. The first two phases were conducted with armor trainees at Ft Knox, and dealt with the gunner and driver positions. The third phase was conducted with armor crewmen in operational armor battalions, and dealt with the tank commander and gunner positions.

Measures of performance used as criteria were based on those aspects of the driver and gunner duties considered by the Armor Center to be critical requirements for combat effectiveness: off-road tactical driving maneuvers and firing of the main gun. The research, therefore, did not address the prediction of performance in routine operational procedures and maintenance tasks.

With armor trainees at Ft Knox a number of potentially useful predictor variables were identified in Phase I. Only one, however, Automotive Information from ASVAB, was validated for drivers in Phase II. None of the tests identified in Phase I for gunner's performance prediction was validated in Phase II. Nevertheless, certain methodological problems entered the Phase II research, so the failure to validate the other tests did not necessarily indicate their lack of relationship to performance. Consequently, the continuing need to make optimal assignments to gunner/loader or driver training may best be addressed by continued research on the paper-and-pencil measures as well as the exploration of other techniques such as job sample performance measurement.

The best paper-and-pencil test candidates for cross validation in further research would be those which were shown in Tables 4 and 7 as

having significant positive relationships with performance. These tests were:

For gunnery - Work Knowledge -- ASVAB
Mathematics Knowledge - ASVAB
Mechanical Comprehension - ASVAB
Visual Recognition - ARI
Visual Memory - ARI
Object Completion - ARI

For driving - Numerical Operations - ASVAB
Arithmetic Reasoning - ASVAB
Electronics Information - ASVAB
Automotive Information - ASVAB
Classification Inventory - Electronics Scale - ASVAB
Lateral Perception - ARI
Visual Memory - ARI

In cross validation research with these variables the unit-weight composites developed in Phase I could be considered in addition to the use of more standard multiple-regression procedures. Unit weight models are based on sums of standardized variables, as with regression models. But in unit weight models the value of 1 replaces each Beta weight. Only the sign is determined from the data (from the zero-order correlation--see Cascio, Valenzi, and Sibley, 1978; Einhorn and Hogart, 1975; and Schmidt, 1977, for further discussion). Such procedures have been suggested as substitutes for multiple regression techniques when one deals with low subject to predictor ratios. Because low ratios are normal in armor research with field performance criteria the unit weight methods seem promising.

The situation with armor crewmen in operational armor units appears to be quite different. None of the favorable results from the initial research conducted with one battalion (Eaton, 1978) were supported in the followup with five battalions. Despite the statistical power offered by the relatively large sample, few significant and no substantial or consistent relations were observed. Consequently, there appears to be little merit in pursuing research on these paper-and-pencil measures as predictors of tank commander or gunner performance in armor units. Perhaps research efforts could best be directed toward the development and empirical validation of job sample and simulator techniques based on sound task analyses. Such job sample/simulator research might also lead to measures to supplement prediction of gunnery performance in OSUT.

REFERENCES

Cascio, W. F., Valenzi, E. R., and Sibley, V. Validation and statistical power: Implications for applied research. Journal of Applied Psychology, 1978, 63, 589-595.

DA Pamphlet 310-12. Index and description of Army training devices. Headquarters, Department of the Army, 1976

Eaton, N. K. Predicting tank gunnery performance (Research Memorandum 78-6). Alexandria, VA: US Army Research Institute, February 1978.

Einhorn, H. J., and Hogart, R. M. Unit weighting schemes for decision making. Organizational Behavior and Human Performance, 1975, 13, 171-192.

Greenstein, R. B., and Hughes, R. G. The development of discriminators for predicting success in Armor crew positions (Research Memorandum 77-27). Alexandria, VA: US Army Research Institute, December 1977.

Hughes, R. G. Development of predictors for tank gunner (Unpublished manuscript). Alexandria, VA: US Army Research Institute (Ft Knox Field Unit), 26 March 1976(a), Revised 21 May 1976(b).

Kaplan, H. Prediction of success in Army aviation training (Technical Research Report 1142). Alexandria, VA: US Army Research Institute, June 1965.

Lord, F. M. and Novick, M. R. Statistical Theories of Mental Test Scores. Reading, MA: Addison-Wesley Publishing Company, 1968.

Schmidt, F. L. The relative efficiency of regression and simple unit predictor weights in applied differential psychology. Educational and Psychological Measurement, 1971, 31, 699-714.

Thomas, J. A., and Sternberg, J. Construction of an experimental selection battery for Armor systems (Research Memorandum 64-2). Alexandria, VA: US Army Research Institute, April 1964.

Training Circular 17-12-6. Field mini-tank range complex. US Army Armor School, Ft Knox, KY. (undated)

APPENDIX A

TANK DRIVER TEST

XM34 Driving Simulator

Trainee_____

GO	NO-GO	
		1. Starting Procedures
☐	☐	-Depress brake pedal
☐	☐	-Transmission lever in P position
☐	☐	-Lock parking brakes
☐	☐	-Both drain valves closed
☐	☐	-Steering control in center position
☐	☐	-Fuel shut-off valve in "ON" position
☐	☐	-Fuel pump switch in "ON" position
☐	☐	-All electrical equipment is "OFF"
☐	☐	-Master battery switch "ON", check for light
☐	☐	-Power plant warning light "ON"
☐	☐	-Check fuel, both tanks
☐	☐	-Purge fuel lines
☐	☐	-Depress accelerator pedal, press start for 15 sec.
☐	☐	-Did not allow engine to surge
☐	☐	-Check generator blower motor
☐	☐	-Engine warm up at 1000-1200 rpm
☐	☐	-Idle tank at 700-750 rpm
☐	☐	-Unlock brakes
☐	☐	-Move transmission to L position
		2. Light box
☐	☐	-Service drive
☐	☐	-Blackout
☐	☐	-IR
		3. Hand and Arm Signals
☐	☐	-Reverse
☐	☐	-Left
☐	☐	-Stop tank
		4. Night Flashlight Signals
☐	☐	-Reverse
☐	☐	-Left
☐	☐	-Forward
		5. Stopping Procedures
☐	☐	-Stop tank
☐	☐	-Lock brakes
☐	☐	-Transmission lever in P position
☐	☐	-Idle tank at 1000 rpm
☐	☐	-Idle tank at 700-750 rpm
☐	☐	-Turn off electrical equipment
☐	☐	-Fuel shut-off switch "UP"
☐	☐	-Master battery switch in "OFF" position

Evaluator_____

APPENDIX B

ADVANCED DRIVING CHECKLIST

Trainee_____

GO	NO-GO	
		1. Starting Procedures
☐	☐	-Depress brake pedal
☐	☐	-Transmission lever in P position
☐	☐	-Lock parking brakes
☐	☐	-Both drain valves closed
☐	☐	-Steering control in center position
☐	☐	-Fuel shut-off valve in "ON" position
☐	☐	-Fuel pump switch in "ON" position
☐	☐	-All electrical equipment is "OFF"
☐	☐	-Master battery switch "ON", check for light
☐	☐	-Power plant warning light "ON"
☐	☐	-Check fuel, both tanks
☐	☐	-Purge fuel lines
☐	☐	-Depress accelerator pedal, press start for 15 sec.
☐	☐	-Did not allow engine to surge
☐	☐	-Check generator blower motor
☐	☐	-Engine warm up at 1000-1200 rpm
☐	☐	-Idle tank at 700-750 rmp
☐	☐	-Unlock brakes
		2. Operate Amplifier Audio Frequency (AM-1780)
☐	☐	-Took correct actions without help
		3. Operate Intercom Control
☐	☐	-Took correct actions without help
		4. Radio Check
☐	☐	-Took correct actions without help
		5. As a Driver, Respond to Hand and Arm Signals
☐	☐	-Start engine
☐	☐	-Forward, left
☐	☐	-Forward, right
☐	☐	-Stop
☐	☐	-Neutral steer
☐	☐	-Back-up, left
☐	☐	-Back-up, right
☐	☐	-Stop

GO	NO-GO	
		6. As a Ground Guide, Gave Proper Hand and Arm Signals
☐	☐	-Start engine
☐	☐	-Forward, left
☐	☐	-Forward, right
☐	☐	-Stop
☐	☐	-Neutral steer
☐	☐	-Back-up, left
☐	☐	-Back-up, right
☐	☐	-Stop
		7. Drive on a Paved Road
☐	☐	-Held a straight line
☐	☐	-Shifted smoothly
☐	☐	-Shifted at proper rpm
☐	☐	-Braked smoothly
☐	☐	-Downshifted at proper rpm
☐	☐	-Made smooth turn
		8. Drive Over Natural Terrain
☐	☐	-Neutral steer
☐	☐	-Ditch crossing, approached too fast, wrong gear, bad angle
☐	☐	-Ditch crossing, descended too fast, bad angle
☐	☐	-Ditch crossing, hit bottom too hard
☐	☐	-Ditch crossing, stopped in bottom of ditch
☐	☐	-Ditch crossing, climbed too slow, bad angle
☐	☐	-Ditch crossing, pitched over too fast
		9. Drive in Reverse Using TC Commands
☐	☐	-Responded quickly
☐	☐	-Took correct actions
		10. Drive Buttoned Up
☐	☐	-Performance was satisfactory/unsatisfactory
		11. Stop the Tank
☐	☐	-Stopped smoothly
☐	☐	-Transmission lever in P position
☐	☐	-Locked brakes
		12. Stop the Engine
☐	☐	-Reved engine to 1200 rpm
☐	☐	-Idled down to proper rpm
☐	☐	-Cut fuel shut-off switch until engine died
☐	☐	-Cut off master battery switch

Tank Commander_____

APPENDIX C

ADVANCED DRIVING

Tank Commander's Rankings

Rank the trainee driver you personally took through the Advanced Driving Course. You may use the checklists you filled out to refresh your memory.

Trainee drivers should be ranked into four groups with an equal number of drivers in each group (if possible). For example, if you had 16 trainee drivers, you would rank 4 as the best drivers in the group, 4 who were above average for the group but not the best drivers, 4 who were below average for the group but not the poorest drivers, and 4 who were the poorest drivers in the group. If it doesn't come out even, place the extra trainee drivers into one of the middle groups.

List the names of the trainee drivers in the table below.

The best drivers in the group

Above average for the group
but not the best drivers

Below average for the group
but not the poorest drivers

The poorest drivers in the group

_____
Tank Commander

APPENDIX D

TABLE VI MOD - TESTING ONLY

	TARGET	SIGHT	ROUNDS	ADJ	AI	INSTRUCTIONS	FIRE COMMAND	SCORE
1	Tank Stat # 1000 meters	PRI	2 HEAT	BOT	1. 2. 3.	Fire command and lay on target Index correct range Cease Fire after 2d round	Gunner HEAT Tank Fire	1st rd____ 2nd rd____
2	Tank Stat # 1400 meters	PRI	2 SABOT	BOT	1. 2. 3.	Fire command and lay target Index correct range Cease fire after 2d round	Gunner SABOT TANK Fire	1st rd____ 2nd rd____
3	Anti-tank Stat # 700 meters	Sec	3 HEP	Range Change and BOT	1. 2. 3. 4.	Fire command and lay on target Index range plus 200 meters Subsequent fire command Cease fire after 2d round	Gunner HEP Anti-tank 700 Fire	2nd rd____ 3rd rd____
4	Moving Tank # 700 meters	PRI	2 HEAT	BOT	1. 2. 3.	Fire command and lay on target Index correct range Cease fire after 2d round	Gunner HEAT Moving tank Fire	1st rd____ 2nd rd____
5	Anti-tank # 1400 meters	Sec	3 HEP	Range Change and BOT	1. 2. 3. 4.	Fire command and lay on target Index range minus 200 meters Subsequent fire command Cease fire after 3d round	Gunner HEP Anti-tank 1400 Fire	2nd rd____ 3rd rd____
6	Moving Tank # 1400 meters	Sec	2 SABOT	BOT	1. 2. 3.	Fire command and lay on target Index correct range Cease fire after 2d round	Gunner SABOT Moving Tank Fire	1st rd____ 2nd rd____

APPENDIX E

MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS OF PHASE I VARIABLES

Phase I Variable Codes, Descriptions, and Sources

Variable Code	Description of Variable-Source
GENINFO	GENERAL INFORMATION - ASVAB
NUMOPS	NUMERICAL OPERATIONS - ASVAB
ATTDET	ATTENTION TO DETAIL - ASVAB
WORDKNOW	WORD KNOWLEDGE - ASVAB
ARIREAS	ARITHMETIC REASONING - ASVAB
SPACEPER	SPACE PERCEPTION - ASVAB
MATHKNOW	MATHEMATICAL KNOWLEDGE - ASVAB
ELECINFO	ELECTRONICS INFORMATION - ASVAB
MECHINFO	MECHANICAL COMPREHENSION - ASVAB
GENSCI	GENERAL SCIENCE - ASVAB
SHOPINFO	SHOP INFORMATION - ASVAB
AUTOINFO	AUTOMOTIVE INFORMATION - ASVAB
CICM	CLASSIFICATION INVENTORY: MECHANICAL - ASVAB
CICA	CLASSIFICATION INVENTORY: ATTENTIVENESS - ASVAB
CICE	CLASSIFICATION INVENTORY: ELECTRONICS - ASVAB
CICC	CLASSIFICATION INVENTORY: COMBAT - ASVAB
LATPER	LATERAL PERCEPTION - ARI
VISREL	VISUAL RECOGNITION - ARI
VISMEM	VISUAL MEMORY - ARI
LOC	LOCATIONS - ARI
SPACEARI	SPEED OF PERCEPTION - ARI
SIMZERO	SIMULATED ZEROING - ARI
OBJCOMP	OBJECT COMPLETION - ARI
PERPRE1	PERSONAL PREFERENCE - ARI
M34	M34 DRIVER TRAINER - OSUT
MIDMTN	MID CYCLE MAINTENANCE - OSUT
MIDCOM	MID CYCLE COMMUNICATIONS - OSUT
MIDWPN	MID CYCLE WEAPONS - OSUT
PISTOL	.45 CAL PISTOL - OSUT
REATIME	REACTION TIME - OSUT
DVGCKL	DRIVING COURSE STANDARDIZED CHECKLIST
TVI	TANK GUNNERY STANDARDIZED TABLE VI HITS

VARIABLE	MEAN	STANDARD DEV
GENINFO	9.1546	2.7564
NUMOPS	26.1031	10.7563
ATTDET	14.3093	3.5542
WORDKNOW	17.0825	5.9155
ARIREAS	11.5773	3.5055
SPACEPER	12.0722	3.1066
MATHKNOW	9.6495	3.7362
ELECINFO	17.7423	4.1939
MECHINFO	9.7526	3.9766
GENSCI	9.1959	3.6276
SHOPINFO	12.6701	4.5385
AUTOINFO	10.8763	4.3380
CICM	12.2577	4.5946
CICA	9.1134	2.8682
CICE	8.2680	4.2390
CICC	18.0103	4.3601
LATPER	29.1649	8.8290
VISREC	25.9381	7.4482
VISMEM	9.6082	4.2514
LOC	19.4124	5.2693
SPACEARI	16.9278	6.8256
SIMZERO	41.2062	3.5851
OBJCOMP	48.1753	10.9668
PERSPREI	.4124	.4948
M34	19.9794	5.3091
MIDMTN	2.5670	.6276
MIDCOM	4.7320	.6695
MIDWPN	5.4948	.7377
PISTOL	28.3093	3.6696
REATIME	48.1031	4.8616
DVGCKL	19.6082	5.0157
TVI	19.4948	4.8651

CORRELATION COEFFICIENTS.

A VALUE OF 99.00000 IS PRINTED
IF A COEFFICIENT CANNOT BE COMPUTED.

NUMOPS	.21055											
ATTDET	.10738	.47489										
WORDKNOW	.51035	.27784	.36321									
ARIREAS	.15924	.20533	-.30779	.39051								
SPACEPER	.10535	-.03420	.25456	.12097	-.02874							
MATHKNOW	.23710	.30780	-.02470	.24923	.46100	.17451						
ELECINFO	.40660	.20772	.29765	.50723	.24121	.21811	.29009					
MECHINFO	.30559	.27385	.12487	.53802	.25322	.32862	.19743	.43897				
GENSCI	.35506	.27338	-.01444	.57593	.46121	.15587	.37019	.42444	.50165			
SHOPINFO	.10698	.41124	.36156	.24895	.26090	.12065	.16573	.40319	.39368	.29374		
AUTOINFO	.38037	.18512	.17614	.27603	.23902	.09729	.19718	.43624	.34422	.37953	.45186	
CICN	.06395	.01295	.02696	.11153	.06634	-.01956	-.04625	.30405	.19224	.17306	.25289	.34551
CICA	.18419	.05837	-.09646	.19222	.12085	-.10330	.10163	.11416	-.06418	.20809	-.05471	.24305
CICE	.02308	-.12581	-.07332	.07679	.19557	.11638	.19213	.15158	-.03743	.14219	.00248	.15250
CICC	.04737	.16900	.21556	.10618	.12296	-.11695	.12172	.22459	.10829	.08549	.47762	.16529
LATPER	.04373	.30628	.24997	.17365	.16046	.08919	.12993	.05939	.18186	.09948	.13759	.15801
VISREC	.07529	.38963	.33795	.18503	.06202	.03216	.08306	.22424	.20628	.09375	.20000	.09519
VISMEM	.06100	.36604	.27903	.17319	.04259	.10075	.13751	.13508	.34049	.23870	.15357	.23305
LOC	.19638	.17898	.23173	.20008	.09187	.23997	.27726	.17596	.30717	.22679	.28277	.20368
SPACEARI	.01494	.28912	.25469	.09741	.11669	.09113	.05251	.01645	.10718	.06747	.08194	.05317
SIMZERO	.10[illegible]	.25174	.07015	.03210	.08163	.13614	.11744	.08809	.09933	.15225	.39026	.28096
OBJCOMP	.07[illegible]	.14431	.25434	.12662	.03121	.38701	.07982	.14141	.24130	.02453	.18650	.13293
PERSPREI	.12775	.09174	-.04958	.09502	.05950	.01632	.12971	-.08880	.01004	.09961	-.02228	-.10701
M36	.05625	.25121	.23937	.22859	.13665	.02535	.08133	.11999	.33921	.15598	.29368	.22015
MIDMTN	-.10502	.07766	.28013	-.00153	.16689	.00317	.09897	-.05471	-.01833	-.03556	.18338	.09490
MIDCON	-.00551	.14419	.07898	.07402	.18202	-.14586	.11196	.13095	-.07212	-.02105	.23456	.13324
MIDWPN	.03357	-.05638	.08404	.26266	.11395	.22515	.16562	.11909	.15579	.18138	.13015	.05513
PISTOL	.06091	-.02668	.01336	.05064	.09691	.17894	.09992	.21438	.16306	.14317	.21071	.24702
REATIME	-.05232	-.13387	-.03864	-.28246	-.00536	.06364	.00889	.05700	-.12367	-.16331	-.00893	-.08286
DVGCKL	-.03312	.16873	.14652	.05833	.21265	.02657	.16325	.18481	.16012	.11189	.06565	.33718
TVI	.07010	.14174	.04527	.20126	.14738	.11685	.18156	.00734	.24653	.04167	.09097	.07647
	GENINFO	NUMOPS	ATTDET	WORDKNOW	ARIREAS	SPACEPER	MATHKNOW	ELECINFO	MECHINFO	GENSCI	SHOPINFO	AUTOINFO

CICA	.15111											
CICE	.40557	.42157										
CICC	.26610	.02573	-.04355									
LATPER	-.05447	.12636	-.01010	.09169								
VISREC	.03304	.06470	-.03873	.18702	.30572							
VISMEM	.04949	.19333	-.10394	.05136	.36667	.45090						
LOC	.10055	.01135	-.04184	.24513	.06525	.31650	.23234					
SPACEARI	-.10868	.03873	-.12677	.12708	.20589	.29579	.26609	.18388				
SIMZERO	.07642	.03924	-.00093	.12048	-.01326	.11088	.20287	.18624	.08447			
OBJCOMP	.00654	-.12926	-.13210	.00846	.13749	.35950	.42174	.32843	.20710	.13917		
PERSPRE1	-.25800	-.18742	-.12774	.04146	-.02527	.13701	.03303	.13386	-.06203	.00663	.32685	
M34	.07922	.12397	.14327	.30691	.21074	.27129	.27100	.31606	.13219	.02914	.29794	.07861
MIDMTN	.15831	.14329	.14979	.05494	.09574	.03432	.11144	-.01159	.06558	-.04639	.04746	-.19053
MIDCOM	.15137	.01057	.05861	.30071	.05338	.32460	.01033	.24425	.13933	.20388	.06321	.08558
MIDWPN	.05725	-.01695	.11037	.03402	.11368	.04734	.00573	.09434	.20162	-.11775	.20005	-.16593
PISTOL	.10273	.06591	.20556	-.01713	.11769	.03386	-.07962	.08384	.07326	.02044	-.01968	.02202
REATIME	-.21572	-.24812	-.18635	.01125	-.12538	-.06800	-.03935	.02557	-.14386	.10874	.12626	.02545
DVGCKL	.09167	.03860	.26269	-.05030	.28539	.09331	.16566	-.10182	.03720	-.12175	-.04002	-.08113
TVI	-.07054	-.09468	-.05953	-.14855	-.08146	.20639	.21666	.10492	.08045	.00038	.20687	.15234

	CICM	CICA	CICE	CICC	LATPER	VISREC	VISMEM	LOC	SPACEARI	SIMZERO	OBJCOMP	PERSPRE1

MIDMTN	.00042						
MIDCOM	.13616	.06798					
MIDWPN	.14093	.17511	-.00283				
PISTOL	.17517	-.04980	.10193	-.03788			
REATIME	-.26658	-.04326	.02778	-.16830	-.01640		
DVGCKL	.16008	.09446	.03355	.14302	.17587	-.10256	
TVI	.11655	-.07579	.16267	.00488	.02285	-.15368	.15445

	M34	MIDMTN	MIDCOM	MIDWPN	PISTOL	REATIME	DVGCKL

APPENDIX F

ADVANCED DRIVING CHECKLIST - TERRAIN DRIVING

TC's please fill in each portion of checklist (#1-9) as driver completes the exercise. Then fill out last question (#10) when driver completes course. It is particularly important that you evaluate each driver accurately, based upon his performance. These results will not affect the drivers you are training today, but will be used to determine the trainees selected for extensive driver training in future OSUT cycles, beginning in 1977.

DRIVER NAME_____ Company_____

1. Main gun engagement. When TC instructs driver to find defilade position and issues fire command does driver:

GO	NO GO	
☐	☐	find hull defilade position
☐	☐	stop tank smoothly
☐	☐	stop tank quickly
☐	☐	hold brakes to prevent tank from moving
☐	☐	doesn't move tank until told to do so by TC

2. Moving coax engagement - troop silhouettes. When TC issues fire command does driver:

GO	NO GO	
☐	☐	continue to drive forward
☐	☐	select smoothest course
☐	☐	maintain steady gun platform
☐	☐	drive at proper speed

3. Main gun engagement. When TC instructs driver to find defilade position and issues fire command does driver:

GO	NO GO	
☐	☐	find hull defilade position
☐	☐	stop tank smoothly
☐	☐	stop tank quickly
☐	☐	hold brakes to prevent tank from moving
☐	☐	doesn't move tank until told to do so by TC

4. Moving coax engagement - troop silhouettes. When TC issues fire commande does driver:

GO	NO GO	
☐	☐	continue to drive forward
☐	☐	select smoothest course
☐	☐	maintain steady gun platform
☐	☐	drive at proper speed

5. Ditch crossing. When crossing the ditch the driver:

GO	NO GO	
☐	☐	didn't approach to fast
☐	☐	did apply brakes smoothly
☐	☐	didn't approach at wrong angle
☐	☐	didn't descend too fast
☐	☐	didn't hit bottom too hard
☐	☐	didn't stop at bottom of ditch
☐	☐	didn't climb out too slowly
☐	☐	didn't climb out wrong angle
☐	☐	didn't climb over too fast

6. Main gun engagement from hull defilade position. When TC issued command to enter firing position driver:

GO	NO GO	
☐	☐	entered position quickly
☐	☐	stopped smoothly
☐	☐	stopped in correct position
☐	☐	kept brakes applied during engagement
☐	☐	didn't move out until told to do so by TC

In backing out of position driver:

GO	NO GO	
☐	☐	followed TC commands smoothly and confidently
☐	☐	followed TC commands correctly (back right or left, etc)
☐	☐	stopped smoothly

7. Main gun engagement from road. When TC issued "Driver Stop" and fire command driver:

GO	NO GO	
☐	☐	stopped tank on road smoothly
☐	☐	stopped tank on road quickly
☐	☐	kept brakes applied during engagement
☐	☐	didn't move out until told to do so by TC

8. Flank moving coax engagement. When TC issued fire command did driver:

GO	NO GO	
☐	☐	continue to drive forward
☐	☐	select smoothest course
☐	☐	maintain steady gun platform
☐	☐	drive at proper speed

9. Ditch crossing: When crossing the ditch the driver:

GO	NO GO	
☐	☐	didn't approach too fast
☐	☐	did apply brakes smoothly
☐	☐	didn't approach at wrong angle
☐	☐	didn't descend too fast
☐	☐	didn't hit bottom too hard
☐	☐	didn't stop at bottom of ditch
☐	☐	didn't climb out too slowly
☐	☐	didn't climb out at wrong angle
☐	☐	didn't pitch over too fast

10. Of all the trainee drivers you have seen, where would you rate this man on a 7 point scale, based on his performance today? Circle one.

1	2	3	4	5	6	7
among the worst	much below average	below average	average	above average	much above average	among the best

TANK COMMANDER_____
signature

APPENDIX G

TABLE VI MOD SCORESHEET - PHASE II

CREW POSITION - OSUT
Table VI (Mod) Score Sheet

Company_____ Plt_____ Name_____

Tank_____ TC_____ Scorer_____

Engagement	Command	Round 1		Round 2	
	"GUNNER"				
0. Stationary, 1200m (Zero Panel, Periscope)	HEAT, ZERO PANEL	H	M	H	M
1. Moving, 700m (Flank Tank, Rear Track) (Left to right) (Periscope, Index 1100m)	BATTLESIGHT, MOVING TANK	H	M	------	
2. Stationary, 830m (Index 700m, BOT) (6 x 6 Panel, Periscope)	BATTLESIGHT, TANK	H	M	H	M
3. Moving, 560m (Flank Tank, Front Track) (Right to Left) (Telescope, 1100m line)	BATTLESIGHT, MOVING TANK	H	M	-------	
4. Stationary, 960m (6 x 6 Panel, Telescope) (Precision, Index 960m)	HEAT, TANK, 960 METERS	H	M	H	M
5. Stationary, 1370m (6 x 6 Panel, Telescope) (1100M Range Line, BOT)	BATTLESIGHT, TANK	H	M	H	M
6. Moving, 1410m (Flank Tank, Front Track) (Right to left) (Telescope, 1400m line)	HEAT, MOVING TANK, 1400 METERS	H	M	H	M
7. Stationary, 1370m (6 x 6 Panel, Periscope) (Precision, Index 1370)	HEAT, TANK	H	M	H	M
8. Moving, 1470m (Flank Tank, Rear Track) (Left to right) (Periscope, Index 1470)	HEAT, MOVING TANK	H	M	H	M
	"FIRE"				

APPENDIX H

MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS OF PHASE II VARIABLES

PHASE II VARIABLE CODES, DESCRIPTIONS, AND SOURCES

Variable Code	Description of Variable-Source
GENINFO	GENERAL INFORMATION - ASVAB
NUMPOS	NUMERICAL OPERATIONS - ASVAB
ATTDET	ATTENTION TO DETAIL - ASVAB
WORDKN	WORD KNOWLEDGE - ASVAB
ARRSNG	ARITHMETIC REASONING - ASVAB
SPACE	SPACE PERCEPTION - ASVAB
MATHKN	MATHEMATICAL KNOWLEDGE - ASVAB
ELEINFO	ELECTRONICS INFORMATION - ASVAB
MECHCOM	MECHANICAL COMPREHENSION - ASVAB
GENSCI	GENERAL SCIENCE - ASVAB
SHOPINFO	SHOP INFORMATION - ASVAB
AUTOINFO	AUTOMOTIVE INFORMATION - ASVAB
CIMECH	CLASSIFICATION INVENTORY: MECHANICAL - ASVAB
CIADMIN	CLASSIFICATION INVENTORY: ATTENTIVENESS - ASVAB
CIELEC	CLASSIFICATION INVENTORY: ELECTRONICS - ASVAB
CICMBT	CLASSIFICATION INVENTORY: COMBAT - ASVAB
LATPER	LATERAL PERCEPTION - ARI
VISREC	VISUAL RECOGNITION - ARI
VISMEM	VISUAL MEMORY - ARI
LOC	LOCATIONS - ARI
SPEED	SPEED OF PERCEPTION - ARI
SIMZERO	SIMULATED ZEROING - ARI
OBJCOMP	OBJECT COMPLETION - ARI
PREF	PERSONAL PREFERENCE - ARI
MAINT	MIDCYCLE MAINTENANCE - OSUT
COMMO	MIDCYCLE COMMUNICATIONS - OSUT
WPNS	MIDCYCLE WEAPONS - OSUT
PISTOL	.45 CAL PISTOL - OSUT
RTAV	REACTION TIME AVERAGE - OSUT
DVRT	STANDARDIZED DRIVER CHECKLIST SCORE - OSUT
DVRR	STANDARDIZED DRIVER RATING SCORE - OSUT
DVRC	DRIVER COMPOSITE STANDARD SCORE - OSUT
TERCHER	TACTICAL DRIVER CHECKLIST - NOT USED
TERRATE	TACTICAL DRIVER RATING - NOT USED
GNRT	TANK GUNNERY TRANSFORMED TABLE VI SCORES
GNRS	TANK GUNNERY STANDARDIZED TABLE VI SCORES

DRIVER SAMPLE

VARIABLE	MEAN	STANDARD DEV
GENINFO	9.6408	2.9520
NUMOPS	28.0704	10.6556
ATTDET	13.7817	3.6865
WORDKN	19.4718	6.1063
ARRSNG	12.6056	3.7473
SPACE	12.1197	3.5017
MATHKN	10.0493	4.1090
ELEINFO	18.7887	4.7592
MECHCOM	10.4225	3.5437
GENSCI	10.6901	4.0021
SHOPINFO	13.1268	5.2523
AUTOINFO	12.1479	4.4162
CIMECH	12.3028	4.0685
CIADMIN	9.6620	2.7156
CIELEC	8.0775	4.3761
CICMBT	18.2324	4.8999
LATPER	30.8380	10.0366
VISREC	27.4859	6.6777
VISMEM	9.6479	4.5929
LOC	21.1901	6.9465
SPEED	21.8169	6.8578
SIMZERO	6.8028	4.5088
OBJCOMP	37.1901	5.4629
PREP	1.6338	.6356
MAINT	2.8521	.3941
COMMO	4.3873	.7612
WPNS	4.7183	.5757
PISTOL	2.6690	.6383
RTAV	44.3697	5.4362
DVRT	491.4085	97.7306
DVRR	49.3338	10.1968
DVRC	492.3732	93.7380
TERCHEK	82.7746	12.3859
TERRATE	4.2676	1.1039

GUNNER SAMPLE

VARIABLE	MEAN	STANDARD DEV
GENINFO	9.7054	3.0628
NUMOPS	27.7946	10.7336
ATTDET	14.3214	3.9278
WORDKN	19.8125	6.2060
ARRSNG	12.4107	3.8003
SPACE	12.4107	3.6627
MATHKN	10.0268	4.2372
ELEINFO	18.6429	5.0006
MECHCOM	10.5268	3.7343
GENSCI	10.5804	4.0795
SHOPINFO	12.7232	5.3376
AUTOINFO	11.8929	4.5090
[illegible]MECH	12.3214	4.1486
C.ADMIN	9.8393	2.7462
CILLEC	8.2143	4.4366
CICMBT	18.4286	4.9241
LATPER	31.3214	9.6069
VISREC	27.8482	7.4800
VISMEM	10.0268	4.6099
LOC	20.8839	6.4497
SPEED	22.4107	6.6948
SIMZERO	6.5982	4.5943
OBJCOMP	37.1696	5.6200
PREF	1.6071	.6759
MAINT	2.8661	.3912
COMMO	4.4286	.7678
WPNS	4.7232	.5569
PISTOL	2.6071	.6625
RTAV	44.4821	5.4611
GNRT	505.4554	104.6970
GNRS	50.7958	9.7939

DRIVER SAMPLE

CORRELATION COEFFICIENTS.

A VALUE OF 99.00000 IS PRINTED
IF A COEFFICIENT CANNOT BE COMPUTED.

NUMOPS	.16676											
ATTDET	.01164	.47234										
WORDKN	.56030	.30469	.08463									
ARRSNG	.44488	.42628	.10102	.45607								
SPACE	.18131	.14119	.21410	.05671	.22576							
MATHKN	.46923	.41038	.12806	.43974	.67836	.21646						
ELEINFO	.44385	.34601	.03333	.43005	.34724	.05685	.36792					
MECHCOM	.57191	.26798	.10646	.45154	.40252	.31081	.32976	.44394				
GENSCI	.44556	.42793	.05547	.58471	.36208	.15094	.36623	.51821	.50537			
SHOPINFO	.19691	.58720	.27835	.17238	.20507	.27951	.17585	.30466	.46007	.42262		
AUTOINFO	.46054	.30995	.06429	.34745	.31212	.16899	.33141	.44759	.56201	.43318	.57432	
CIMECH	-.08300	.02699	.03896	-.17165	-.06840	.06663	-.04587	.14361	.12929	-.00539	.22122	.32590
CIADMIN	.06349	.06431	.11230	.09902	.00005	.01947	.23350	.18620	.06811	.06991	-.09841	.04500
CIELEC	-.13948	.05007	.06524	-.09772	-.06257	.00263	.02661	.04370	-.00533	-.01765	-.01493	.01005
CICMDT	.05582	.27068	.15917	-.00694	.04829	.19636	.12870	.00972	.14951	.21274	.38631	.16752
LATPER	.17612	.37824	.24420	.23143	.30001	.17915	.29908	.20878	.22268	.15800	.28830	.18392
VISREC	.20092	.39262	.27029	.31281	.29596	.08909	.40647	.28622	.24062	.24531	.23684	.14954
VISMEM	.25634	.36309	.23670	.25935	.26714	.30206	.29104	.27236	.31205	.23054	.34554	.17811
LOC	.26759	.29010	.20919	.25837	.12987	.17808	.17733	.33202	.30845	.23939	.26292	.24714
SPEED	.19712	.42809	.31625	.31540	.36147	.24870	.36627	.24979	.21858	.20051	.17471	.12291
SINZERO	-.19591	-.19138	-.08368	-.09191	-.02310	-.15391	-.06302	-.19728	-.31878	-.17831	-.29033	-.30306
OBJCOMP	.30640	.25209	.13167	.27368	.13222	.23385	.10384	.38155	.35119	.36701	.35633	.32102
PREF	.00122	.09839	-.08502	-.00089	.16227	-.26058	.09584	.02113	.09029	.08333	.09686	.14577
MAINT	.00889	.16465	.08502	-.05922	.08990	.09002	-.05241	.19122	.12125	.10565	.24556	.22866
COMMD	.10651	.22221	.10017	.23048	.21306	.16341	.13897	.18132	.16784	.23291	.26969	.22757
WPNS	.14871	.17668	.15795	.05422	.04677	.05906	.06887	.10755	.21519	.07882	.23002	.24803
PISTOL	-.09742	-.06120	-.04298	-.15981	-.10597	-.16619	-.08027	-.16093	-.16035	-.07097	-.03605	-.02528
RTAV	.01872	.02575	.04422	-.13979	.05125	.04572	-.02813	.01250	-.02565	.06610	-.06673	-.21573
DVRT	.01707	.03475	-.02951	.06080	-.03919	-.07160	-.00731	.02074	.09360	.07093	.11025	.18298
DVRR	.02048	.04879	-.04299	.01912	-.01080	-.11235	-.05391	.05109	.10592	.08389	.14837	.17024
DVRC	.02049	.04469	-.03984	.04209	-.02422	-.09843	-.03313	.03860	.10640	.08260	.13817	.18798
TERCHEK	.04258	.04913	-.01537	.06406	-.02714	-.02308	.00900	.00641	.10511	.06840	.14729	.17462
TERRATE	.01012	.06230	-.02388	.02427	-.01031	-.10375	-.03889	.03784	.11230	.08472	.14701	.15330
	GENINFO	NUMOPS	ATTDET	WORDKN	ARRSNG	SPACE	MATHKN	ELEINFO	MECHCOM	GENSCI	SHOPINFO	AUTOINFO

DRIVER SAMPLE

CIADMIN	.10947											
CIELEC	.35957	.36150										
CICMBT	.18108	.11255	.14832									
LATPER	.03907	.07050	.12188	.19056								
VISREC	-.02790	.07248	-.10080	-.03230	.24891							
VISMEM	.04256	.02110	.14569	.23938	.53524	.30438						
LOC	.06269	.01809	.00721	.08766	.17846	.40453	.33022					
SPEED	.02488	.11509	.06547	.09541	.44614	.43265	.43341	.24147				
SIMZERO	-.14513	-.00432	.02989	-.07110	-.03378	-.13035	-.24277	-.23723	-.19912			
OBJCOMP	.11926	.01106	-.02969	.07332	.29756	.19614	.40605	.36946	.31197	-.27402		
PREF	-.00618	.00174	-.19882	.01613	.00842	.13413	-.17325	-.15600	-.01712	-.03033	-.05538	
MAINT	.06794	.09213	-.07145	.13547	-.04196	.12992	.11209	.08807	-.03109	-.22011	.15812	.03709
COMMO	-.04063	-.02199	.06332	.14303	.37589	.08131	.22998	.15095	.20661	-.13670	.32498	.13400
WPNS	-.02388	.14734	.10725	.06611	.29891	.08936	.22508	.12876	.15570	-.05160	.12539	.00682
PISTOL	-.06491	-.07319	-.03392	-.06367	-.26085	-.05851	-.24083	-.00650	-.19703	-.05488	-.15675	.03127
RTAV	-.10771	.01621	-.06069	.08621	-.16443	-.04884	-.04929	.04996	.03579	-.02898	-.02244	-.13399
DVRT	.05527	.15167	.02745	.13179	.01383	-.00986	.05022	.07388	-.04108	-.06027	.05682	.01464
DVRR	.07716	.04467	.01182	.06263	.03879	-.04314	.06584	.07567	-.06364	-.12953	.10176	.03632
DVRC	.07077	.10336	.02074	.10276	.02831	-.02860	.06199	.07967	-.05603	-.10187	.08497	.02739
TERCHEK	.05682	.13794	.05018	.17908	.14718	-.03871	.13910	.04188	-.05852	-.03763	.11007	.02998
TERRATE	.05762	.06351	.00155	.06316	.00266	-.00237	.03970	.11540	-.07967	-.12184	.09264	.03958
	CIMECH	CIADMIN	CIELEC	CICMBT	LATPER	VISREC	VISMEM	LOC	SPEED	SIMZERO	OBJCOMP	PREF

COMMO	-.06777								
WPNS	.12769	.13745							
PISTOL	-.08320	-.09920	-.15903						
RTAV	-.05044	-.09570	-.12398	-.00638					
DVRT	.00766	.00978	.02702	.00787	-.04154				
DVRR	.13341	.01912	-.02664	-.00364	-.03333	.76256			
DVRC	.07655	.01550	-.00041	.00212	-.03978	.93605	.94142		
TERCHEK	.04979	.11163	.10542	-.07589	-.11109	.90924	.68816	.84827	
TERRATE	.17316	.02770	-.00330	-.00425	-.04497	.75042	.98213	.92537	.70105
	MAINT	COMMO	WPNS	PISTOL	RTAV	DVRT	DVRR	DVRC	TERCHEK

GUNNER SAMPLE

CORRELATION COEFFICIENTS.

A VALUE OF 99.00000 IS PRINTED
IF A COEFFICIENT CANNOT BE COMPUTED.

NUMOPS	.16257											
ATTDET	-.03849	.48730										
WORDKN	.62080	.25449	.00028									
ARRSNG	.52674	.44778	.05686	.46741								
SPACE	.11930	.16234	.23434	.11637	.22854							
MATHKN	.50667	.38282	.10124	.40994	.64326	.26166						
ELEINFO	.46481	.36335	.08571	.42166	.43586	.06415	.40097					
MECHCOM	.57215	.28255	.14191	.44629	.40677	.33972	.34128	.49453				
GENSCI	.46733	.44818	.03380	.56978	.34768	.09302	.34828	.51767	.48419			
SHOPINFO	.27656	.61887	.30294	.21735	.26192	.20540	.20069	.36551	.51224	.50476		
AUTOINFO	.54827	.28677	.06555	.42715	.39848	.04797	.34343	.47815	.60744	.50445	.60330	
CIMECH	-.08536	.01181	.10086	-.12221	-.03931	-.02062	-.10504	.11675	.13435	.03519	.22212	.30190
CIADMIN	.01360	.10340	.15100	.03522	.01501	.13828	.18619	.10665	.00833	.06550	.01538	.07281
CIELEC	-.18692	.04974	.12888	-.14446	-.11587	.09821	-.02571	.02988	-.03298	-.06965	-.01041	-.05739
CICMST	.09028	.24594	.15678	-.09758	.03721	.16198	.13675	-.02739	.07482	.26018	.46420	.22688
LATPER	.17103	.43163	.22262	.26516	.39265	.17518	.32246	.19988	.27800	.17105	.31044	.18258
VISREC	.10499	.43678	.31690	.20665	.23167	.09799	.30740	.19628	.21156	.22670	.25279	.13040
VISMEM	.19581	.35205	.27168	.17621	.26934	.26452	.31774	.32674	.32468	.22623	.30382	.09072
LOC	.25319	.23090	.23833	.25063	.14935	.20263	.14417	.25037	.32910	.22651	.24636	.15849
SPEED	.17159	.50003	.35981	.29763	.35307	.30535	.38515	.24526	.17072	.16437	.24070	.09399
SIMZERO	-.11157	-.13615	-.11210	-.09272	-.07973	-.22942	-.05035	-.17296	-.27846	-.20375	-.28011	-.28652
OBJCOMP	.26463	.18516	.10440	.24533	.10924	.23844	.06228	.38378	.40996	.32532	.34112	.28324
PREF	-.04336	.01858	-.06060	.03168	.09494	-.22535	.12638	.02208	.04704	.12263	.06947	.10726
MAINT	.08705	.24224	.13965	.02667	.18275	.05130	.08913	.22399	.18438	.16767	.19779	.24713
COMMD	.16529	.23707	.07938	.26660	.19849	.15790	.13214	.14347	.18135	.19888	.26663	.24240
WPNS	.04683	.21348	.15226	.03177	.10103	-.05419	.08717	.05800	.18772	.11497	.24981	.18543
PISTOL	.00016	-.11281	-.04105	-.11888	-.19298	-.15568	-.07003	-.16511	-.16687	-.13156	-.06925	.04309
RTAV	-.05068	.11044	.02715	-.19587	.00578	.00938	-.05974	.00702	-.10114	.00451	-.01516	-.20441
GNRT	-.01573	.06418	.26374	.08005	.03829	-.02763	-.03949	-.05907	-.03051	-.04545	-.03084	-.05570
GNRS	.00777	.10044	.24273	.08981	.07021	-.04411	-.05922	-.04917	.00616	-.02660	.05605	-.01434
	GENINFO	NUMOPS	ATTDET	WORDKN	ARRSNG	SPACE	MATHKN	ELEINFO	MECHCOM	GENSCI	SHOPINFO	AUTOINFO

GUNNER SAMPLE

CIADMIN	.13584											
CIELEC	.33591	.44873										
CICMBT	.19959	.08242	.02999									
LATPER	-.01979	.06891	.09285	.09628								
VISREC	-.02803	.03784	-.12660	-.03124	.21206							
VISMEM	-.00045	.06225	.15301	.12768	.46869	.32174						
LOC	-.04573	-.05091	-.10995	.09150	.21245	.33109	.29674					
SPEED	-.04015	.09036	-.01512	.00500	.52685	.41072	.32307	.26379				
SIMZERO	-.08250	-.00516	.05774	-.05843	-.09972	-.16616	-.22493	-.20225	-.25790			
OBJCOMP	.13540	-.03097	-.09214	.03736	.16337	.26714	.34401	.36581	.22386	-.28247		
PREF	-.05737	.08701	-.16094	-.00309	.09038	.03621	-.09778	-.13868	-.04963	-.04548	.01022	
MAINT	.08782	.21456	-.10269	.18905	.00437	.18385	.16684	.05448	.04183	-.22066	.14854	-.03042
COMMD	-.02950	.02442	-.02191	.15592	.38667	.09614	.25636	.10292	.18454	-.25468	.28803	.17112
WPNS	-.11323	.10026	.05704	.13236	.38559	.10229	.16084	.09131	.16126	-.07203	.03964	.11540
PISTOL	-.01920	-.02511	-.08758	-.08601	-.28857	-.17031	-.32397	-.06981	-.14204	-.07897	-.19519	.05461
RTAV	-.14449	-.04975	-.08945	.07567	-.07682	-.07152	-.07316	.07002	.00488	.02980	-.09316	-.14225
GNRT	-.12464	-.00200	.06071	-.07956	.09375	-.08402	-.02282	.04440	-.02254	.20180	-.10572	.03323
GNRS	-.08676	-.04817	.00126	-.00068	.12626	-.06275	.06119	.06630	-.02278	.11888	-.07019	.05206
	CIMECH	CIADMIN	CIELEC	CICMBT	LATPER	VISREC	VISMEM	LOC	SPEED	SIMZERO	OBJCOMP	PREF

COMMD	-.13711					
WPNS	.07643	.17460				
PISTOL	-.06579	-.16195	-.10205			
RTAV	-.01800	-.24203	-.06089	.03789		
GNRT	.01910	-.00850	.08702	-.04299	-.01278	
GNRS	.06198	.02841	.11294	-.06783	-.02950	.93382
	MAINT	COMMD	WPNS	PISTOL	RTAV	GNRT

APPENDIX I

PREDICTOR VARIABLE MEANS, STANDARD DEVIATIONS, AND INTERCORRELATIONS - PHASE III

Commander's Predictor Tests

Test	N	Mean	Standard Deviation
Simulated Zeroing	211	42.29	3.38
Visual Memory	211	9.23	4.08
Speed of Perception	211	19.60	6.28
Patterns	211	90.43	14.59
Attention to Detail	211	39.58	9.36
Object Completion	211	72.28	11.47
Locations	208	19.74	5.96
Mechanical Abilities	201	35.07	7.34
Lateral Perception	202	30.06	6.31
Visual Recognition	203	30.52	5.91

Gunner's Predictor Tests

Test	N	Mean	Standard Deviation
Simulated Zeroing	209	42.29	3.23
Visual Memory	208	8.60	4.34
Speed of Perception	208	18.66	6.61
Patterns	207	87.36	20.48
Attention to Detail	208	38.68	8.01
Object Completion	209	72.10	10.68
Locations	208	19.68	4.82
Mechanical Abilities	201	32.75	8.08
Lateral Perception	197	28.26	7.02
Visual Recognition	199	29.63	6.07

Tank Commander's Predictor Variable Scores

	Visual Memory	Speed of Perception	Patterns Test	Attention to Detail	Object Completion	Locations Test	Mechanical Abilities	Lateral Perception	Visual Recognition
Simulated Zeroing	.125	.058	.173	.032	.142	.190	.079	.013	.054
Visual Memory		.272	.313	.314	.516	.315	.212	.276	.320
Speed of Perception			.214	.221	.315	.211	.064	.339	.304
Patterns Test				.274	.462	.343	.283	.346	.309
Attention to Detail					.288	.132	.077	.385	.382
Object Completion						.471	.278	.390	.354
Locations Test							.201	.220	.264
Mechanical Abilities								.130	.017
Lateral Perception									.449

Gunner's Predictor Variable Scores

	Visual Memory	Speed of Perception	Patterns Test	Attention to Detail	Object Completion	Locations Test	Mechanical Abilities	Lateral Perception	Visual Recognition
Simulated Zeroing	.061	.028	.209	.058	.046	.078	.136	.145	.024
Visual Memory		.199	.253	.223	.405	.300	.200	.386	.474
Speed of Perception			.264	.336	.337	.134	.223	.278	.400
Patterns Test				.237	.379	.358	.262	.311	.332
Attention to Detail					.134	.022	.136	.305	.358
Object Completion						.392	.243	.342	.485
Locations Test							.365	.366	.250
Mechanical Abilities								.380	.296
Lateral Perception									.430

APPENDIX J

INTERCORRELATION MATRIX BETWEEN GUNNERY SUMMARY VARIABLES OVERALL, AND EACH OF THE 5 BATTALIONS SEPARATELY

SUMMARY CRITERION VARIABLES

Variable	Code	Description
1	302	Mean Main Gun Opening Time (Day)
2	303	Mean Main Gun Opening Time (Night)
3	304	Mean Main Gun Opening Time (Day and Night)
4	305	1st Round Main Gun Hits (Day)
5	306	1st Round Main Gun Hits (Night)
6	307	1st Round Main Gun Hits (Day and Night)
7	308	Main Gun Hits (Day)
8	309	Main Gun Hits (Night)
9	310	Main Gun Hits (Day and Night)
10	311	Standardized Measure of Opening Time (Day and Night)
11	312	Standardized Measure of Hits (Day and Night)

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FILE TANK (CREATION DATE = 29 DEC 77)

PEARSON CORRELATION COEFFICIENTS

	VAR302	VAR303	VAR304	VAR305	VAR306	VAR307	VAR308	VAR309	VAR310	VAR311
VAR302	1.0000	.2607	.7578	-.1308	-.1160	-.1631	-.1126	-.1510	-.1603	.6686
	(0)	(184)	(184)	(196)	(194)	(193)	(196)	(194)	(193)	(184)
	Sig .001	Sig .001	Sig .001	Sig .034	Sig .054	Sig .012	Sig .058	Sig .018	Sig .013	Sig .001
VAR303	.2607	1.0000	.8274	-.2494	-.1081	-.2546	-.0904	-.1718	-.1582	.6419
	(184)	(0)	(184)	(191)	(189)	(188)	(191)	(189)	(188)	(184)
	Sig .001	Sig .001	Sig .001	Sig .001	Sig .069	Sig .001	Sig .107	Sig .009	Sig .015	Sig .001
VAR304	.7578	.8274	1.0000	-.2520	-.1364	-.2682	-.1440	-.1874	-.2051	.8227
	(184)	(184)	(0)	(183)	(181)	(180)	(183)	(181)	(180)	(184)
	Sig .001	Sig .001	Sig .001	Sig .001	Sig .034	Sig .001	Sig .026	Sig .006	Sig .003	Sig .001
VAR305	-.1308	-.2494	-.2520	1.0000	.0699	.8118	.6060	.1201	.5200	-.1843
	(196)	(191)	(183)	(0)	(207)	(207)	(210)	(207)	(207)	(183)
	Sig .034	Sig .001	Sig .001	Sig .001	Sig .158	Sig .001	Sig .001	Sig .042	Sig .001	Sig .006
VAR306	-.1160	-.1081	-.1364	.0699	1.0000	.6392	.1895	.6746	.4954	-.0296
	(194)	(189)	(181)	(207)	(0)	(207)	(207)	(208)	(207)	(181)
	Sig .054	Sig .069	Sig .034	Sig .158	Sig .001	Sig .001	Sig .003	Sig .001	Sig .001	Sig .346
VAR307	-.1631	-.2546	-.2682	.8118	.6392	1.0000	.5773	.4869	.6908	-.1594
	(193)	(188)	(180)	(207)	(207)	(0)	(207)	(207)	(207)	(180)
	Sig .012	Sig .001	Sig .001	Sig .001	Sig .001	Sig .001	Sig .001	Sig .001	Sig .001	Sig .016
VAR308	-.1126	-.0904	-.1440	.6060	.1895	.5773	1.0000	.1970	.8586	-.1811
	(196)	(191)	(183)	(210)	(207)	(207)	(0)	(207)	(207)	(183)
	Sig .058	Sig .107	Sig .026	Sig .001	Sig .003	Sig .001	Sig .001	Sig .002	Sig .001	Sig .007
VAR309	-.1510	-.1718	-.1874	.1201	.6746	.4869	.1970	1.0000	.6718	-.0636
	(194)	(189)	(181)	(207)	(208)	(207)	(207)	(0)	(207)	(181)
	Sig .018	Sig .009	Sig .006	Sig .042	Sig .001	Sig .001	Sig .002	Sig .001	Sig .001	Sig .197
VAR310	-.1603	-.1582	-.2051	.5200	.4954	.6908	.8586	.6718	1.0000	-.1753
	(193)	(188)	(180)	(207)	(207)	(207)	(207)	(207)	(0)	(180)
	Sig .013	Sig .015	Sig .003	Sig .001	Sig .001	Sig .001	Sig .001	Sig .001	Sig .001	Sig .009
VAR311	.6686	.6419	.8227	-.1843	-.0296	-.1594	-.1811	-.0636	-.1753	1.0000
	(184)	(184)	(184)	(183)	(181)	(180)	(183)	(181)	(180)	(0)
	Sig .001	Sig .001	Sig .001	Sig .006	Sig .346	Sig .016	Sig .007	Sig .197	Sig .009	Sig .001
VAR312	-.1133	-.1217	-.1545	.4978	.4664	.6567	.8532	.6287	.9734	-.1801
	(193)	(188)	(180)	(207)	(207)	(207)	(207)	(207)	(207)	(180)
	Sig .058	Sig .048	Sig .019	Sig .001	Sig .001	Sig .001	Sig .001	Sig .001	Sig .001	Sig .008

(COEFFICIENT / (CASES) / SIGNIFICANCE) (A VALUE OF 99.0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED)

Battalion 1

PEARSON CORRELATION COEFFICIENTS

	VAR302	VAR303	VAR304	VAR305	VAR306	VAR307	VAR308	VAR309	VAR310	VAR311
VAR302	1.0000	-.0427	.5705	-.0208	-.0840	-.0706	-.2096	-.0467	-.1746	.5705
	(0)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)
	S= .001	S= .390	S= .001	S= .446	S= .292	S= .382	S= .084	S= .380	S= .126	S= .001
VAR303	-.0427	1.0000	.7962	-.1030	-.1600	-.1810	-.0518	-.1285	-.0946	.7962
	(45)	(0)	(45)	(46)	(46)	(46)	(46)	(46)	(46)	(45)
	S= .390	S= .001	S= .001	S= .248	S= .144	S= .114	S= .366	S= .197	S= .266	S= .001
VAR304	.5705	.7962	1.0000	-.0996	-.1814	-.1921	-.1666	-.1322	-.1811	1.0000
	(45)	(45)	(0)	(45)	(45)	(45)	(45)	(45)	(45)	(45)
	S= .001	S= .001	S= .001	S= .258	S= .117	S= .103	S= .137	S= .193	S= .117	S= .001
VAR305	-.0208	-.1030	-.0996	1.0000	.0316	.7501	.5848	.1792	.5072	-.0996
	(45)	(46)	(45)	(0)	(46)	(46)	(46)	(46)	(46)	(45)
	S= .446	S= .248	S= .258	S= .001	S= .418	S= .001	S= .001	S= .117	S= .001	S= .258
VAR306	-.0840	-.1600	-.1814	.0316	1.0000	.6847	.3265	.6181	.5116	-.1814
	(45)	(46)	(45)	(46)	(0)	(46)	(46)	(46)	(46)	(45)
	S= .292	S= .144	S= .117	S= .418	S= .001	S= .001	S= .015	S= .001	S= .001	S= .117
VAR307	-.0706	-.1810	-.1921	.7501	.6847	1.0000	.6424	.5596	.7084	-.1921
	(45)	(46)	(45)	(46)	(46)	(0)	(46)	(46)	(46)	(45)
	S= .322	S= .114	S= .103	S= .001	S= .001	S= .001	S= .001	S= .001	S= .001	S= .103
VAR308	-.2096	-.0518	-.1666	.5848	.3265	.6424	1.0000	.4171	.9162	-.1666
	(45)	(46)	(45)	(46)	(46)	(46)	(0)	(46)	(46)	(45)
	S= .084	S= .366	S= .137	S= .001	S= .015	S= .001	S= .001	S= .002	S= .001	S= .137
VAR309	-.0467	-.1285	-.1322	.1792	.6181	.5596	.4171	1.0000	.7463	-.1322
	(45)	(46)	(45)	(46)	(46)	(46)	(46)	(0)	(46)	(45)
	S= .380	S= .197	S= .193	S= .117	S= .001	S= .001	S= .002	S= .001	S= .001	S= .193
VAR310	-.1746	-.0946	-.1811	.5072	.5116	.7084	.9162	.7463	1.0000	-.1811
	(45)	(46)	(45)	(46)	(46)	(46)	(46)	(46)	(0)	(45)
	S= .126	S= .266	S= .117	S= .001	S= .001	S= .001	S= .001	S= .001	S= .001	S= .117
VAR311	.5705	.7962	1.0000	-.0996	-.1814	-.1921	-.1666	-.1322	-.1811	1.0000
	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(45)	(0)
	S= .001	S= .001	S= .001	S= .258	S= .117	S= .103	S= .137	S= .193	S= .117	S= .001
VAR312	-.1746	-.0946	-.1811	.5072	.5116	.7084	.9162	.7463	1.0000	-.1811
	(45)	(46)	(45)	(46)	(46)	(46)	(46)	(46)	(46)	(45)
	S= .126	S= .266	S= .117	S= .001	S= .001	S= .001	S= .001	S= .001	S= .001	S= .117

(COEFFICIENT / (CASES) / SIGNIFICANCE) (A VALUE OF 99.0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED)

Battalion 2

- - - - - - - - - - - - PEARSON CORRELATION COEFFICIENTS - - - - - - - - - - - -

	VAR302	VAR303	VAR304	VAR305	VAR306	VAR307	VAR308	VAR309	VAR310	VAR311
VAR302	1.0000	.1727	.7074	-.0466	.2508	.0894	-.1332	.2273	.0148	.7074
	(0)	(40)	(40)	(39)	(37)	(36)	(39)	(37)	(36)	(40)
	S= .001	S= .143	S= .001	S= .389	S= .067	S= .302	S= .209	S= .088	S= .466	S= .001
VAR303	.1727	1.0000	.8184	-.0984	.0857	-.0381	-.1161	.1920	.0059	.8184
	(40)	(0)	(40)	(39)	(37)	(36)	(39)	(37)	(36)	(40)
	S= .143	S= .001	S= .001	S= .276	S= .307	S= .413	S= .241	S= .128	S= .486	S= .001
VAR304	.7074	.8184	1.0000	-.0978	.2002	.0221	-.1603	.2618	.0123	99.0000
	(40)	(40)	(0)	(39)	(37)	(36)	(39)	(37)	(36)	(40)
	S= .001	S= .001	S= .001	S= .277	S= .117	S= .449	S= .165	S= .059	S= .472	S=*****
VAR305	-.0466	-.0984	-.0978	1.0000	-.1524	.8018	.5656	.0171	.4573	-.0978
	(39)	(39)	(39)	(0)	(36)	(36)	(39)	(36)	(36)	(39)
	S= .389	S= .276	S= .277	S= .001	S= .187	S= .001	S= .001	S= .461	S= .003	S= .277
VAR306	.2508	.0857	.2002	-.1524	1.0000	.4684	.0245	.6937	.4494	.2002
	(37)	(37)	(37)	(36)	(0)	(36)	(36)	(37)	(36)	(37)
	S= .067	S= .307	S= .117	S= .187	S= .001	S= .002	S= .444	S= .001	S= .003	S= .117
VAR307	.0894	-.0381	.0221	.8018	.4684	1.0000	.5284	.4346	.6805	.0221
	(36)	(36)	(36)	(36)	(36)	(0)	(36)	(36)	(36)	(36)
	S= .302	S= .413	S= .449	S= .001	S= .002	S= .001	S= .001	S= .004	S= .001	S= .449
VAR308	-.1332	-.1161	-.1603	.5656	.0245	.5284	1.0000	.0109	.7843	-.1603
	(39)	(39)	(39)	(39)	(36)	(36)	(0)	(36)	(36)	(39)
	S= .209	S= .241	S= .165	S= .001	S= .444	S= .001	S= .001	S= .475	S= .001	S= .165
VAR309	.2273	.1920	.2618	.0171	.6937	.4346	.0109	1.0000	.6289	.2618
	(37)	(37)	(37)	(36)	(37)	(36)	(36)	(0)	(36)	(37)
	S= .088	S= .128	S= .059	S= .461	S= .001	S= .004	S= .475	S= .001	S= .001	S= .059
VAR310	.0148	.0059	.0123	.4573	.4494	.6805	.7843	.6289	1.0000	.0123
	(36)	(36)	(36)	(36)	(36)	(36)	(36)	(36)	(0)	(36)
	S= .466	S= .486	S= .472	S= .003	S= .003	S= .001	S= .001	S= .001	S= .001	S= .472
VAR311	.7074	.8184	99.0000	-.0978	.2002	.0221	-.1603	.2618	.0123	1.0000
	(40)	(40)	(40)	(39)	(37)	(36)	(39)	(37)	(36)	(0)
	S= .001	S= .001	S=*****	S= .277	S= .117	S= .449	S= .165	S= .059	S= .472	S= .001
VAR312	.0148	.0059	.0123	.4573	.4494	.6805	.7843	.6289	99.0000	.0123
	(36)	(36)	(36)	(36)	(36)	(36)	(36)	(36)	(36)	(36)
	S= .466	S= .486	S= .472	S= .003	S= .003	S= .001	S= .001	S= .001	S=*****	S= .472

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Battalion 3

PEARSON CORRELATION COEFFICIENTS

	VAR302	VAR303	VAR304	VAR305	VAR306	VAR307	VAR308	VAR309	VAR310	VAR311
VAR302	1.0000 (0) S= .001	.1966 (38) S= .118	.7864 (38) S= .001	-.3029 (38) S= .032	-.1909 (38) S= .125	-.3308 (38) S= .021	-.2896 (38) S= .039	-.2079 (38) S= .105	-.3428 (38) S= .018	.7864 (38) S= .001
VAR303	.1966 (38) S= .118	1.0000 (0) S= .001	.7603 (38) S= .001	-.3907 (41) S= .006	.1163 (41) S= .234	-.2436 (41) S= .062	-.4023 (41) S= .005	.2160 (41) S= .087	-.2733 (41) S= .042	.7603 (38) S= .001
VAR304	.7864 (38) S= .001	.7603 (38) S= .001	1.0000 (0) S= .001	-.4729 (38) S= .001	-.0415 (38) S= .402	-.3796 (38) S= .009	-.4746 (38) S= .001	.0002 (38) S= .500	-.4201 (38) S= .004	99.0000 (38) S=*****
VAR305	-.3029 (38) S= .032	-.3907 (41) S= .006	-.4729 (38) S= .001	1.0000 (0) S= .001	.1020 (41) S= .263	.0409 (41) S= .001	.6514 (41) S= .001	-.0069 (41) S= .483	.5838 (41) S= .001	-.4729 (38) S= .001
VAR306	-.1909 (38) S= .125	.1163 (41) S= .234	-.0415 (38) S= .402	.1020 (41) S= .263	1.0000 (0) S= .001	.6242 (41) S= .001	.0528 (41) S= .372	.7687 (41) S= .001	.3643 (41) S= .010	-.0415 (38) S= .402
VAR307	-.3308 (38) S= .021	-.2436 (41) S= .062	-.3796 (38) S= .009	.0409 (41) S= .001	.6242 (41) S= .001	1.0000 (0) S= .001	.5403 (41) S= .001	.4127 (41) S= .004	.6567 (41) S= .001	-.3796 (38) S= .009
VAR308	-.2896 (38) S= .039	-.4023 (41) S= .005	-.4746 (38) S= .001	.6514 (41) S= .001	.0528 (41) S= .372	.5403 (41) S= .001	1.0000 (0) S= .001	.0256 (41) S= .437	.9112 (41) S= .001	-.4746 (38) S= .001
VAR309	-.2079 (38) S= .105	.2160 (41) S= .087	.0002 (38) S= .500	-.0069 (41) S= .483	.7687 (41) S= .001	.4127 (41) S= .004	.0256 (41) S= .437	1.0000 (0) S= .001	.4352 (41) S= .002	.0002 (38) S= .500
VAR310	-.3428 (38) S= .018	-.2733 (41) S= .042	-.4201 (38) S= .004	.5838 (41) S= .001	.3643 (41) S= .010	.6567 (41) S= .001	.9112 (41) S= .001	.4352 (41) S= .002	1.0000 (0) S= .001	-.4201 (38) S= .004
VAR311	.7864 (38) S= .001	.7603 (38) S= .001	99.0000 (38) S=*****	-.4729 (38) S= .001	-.0415 (38) S= .402	-.3796 (38) S= .009	-.4746 (38) S= .001	.0002 (38) S= .500	-.4201 (38) S= .004	1.0000 (0) S= .001
VAR312	-.3428 (38) S= .018	-.2733 (41) S= .042	-.4201 (38) S= .004	.5838 (41) S= .001	.3643 (41) S= .010	.6567 (41) S= .001	.9112 (41) S= .001	.4352 (41) S= .002	1.0000 (41) S= .001	-.4201 (38) S= .004

(COEFFICIENT / (CASES) / SIGNIFICANCE) (A VALUE OF 99.0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED)

Battalion 4

PEARSON CORRELATION COEFFICIENTS

	VAR302	VAR303	VAR304	VAR305	VAR306	VAR307	VAR308	VAR309	VAR310	VAR311
VAR302	1.0000	.0427	.8490	.1513	.0438	.1377	.0268	-.0627	-.0055	.8490
	(0)	(42)	(42)	(43)	(43)	(43)	(43)	(43)	(43)	(42)
	S= .001	S= .394	S= .001	S= .166	S= .390	S= .189	S= .432	S= .345	S= .486	S= .001
VAR303	.0427	1.0000	.5643	-.3788	.0620	-.2528	-.1478	-.2958	-.2571	.5643
	(42)	(0)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)
	S= .394	S= .001	S= .001	S= .007	S= .348	S= .053	S= .175	S= .029	S= .050	S= .001
VAR304	.8490	.5643	1.0000	-.0713	.0648	-.0195	-.0589	-.2018	-.1399	1.0000
	(42)	(42)	(0)	(42)	(42)	(42)	(42)	(42)	(42)	(42)
	S= .001	S= .001	S= .001	S= .327	S= .342	S= .451	S= .356	S= .100	S= .188	S= .001
VAR305	.1513	-.3788	-.0713	1.0000	.1812	.8525	.7028	.2949	.7295	-.0713
	(43)	(42)	(42)	(0)	(43)	(43)	(43)	(43)	(43)	(42)
	S= .166	S= .007	S= .327	S= .001	S= .122	S= .001	S= .001	S= .027	S= .001	S= .327
VAR306	.0438	.0620	.0648	.1812	1.0000	.6686	.2762	.4969	.4587	.0648
	(43)	(42)	(42)	(43)	(0)	(43)	(43)	(43)	(43)	(42)
	S= .390	S= .348	S= .342	S= .122	S= .001	S= .001	S= .037	S= .001	S= .001	S= .342
VAR307	.1377	-.2528	-.0195	.8525	.6686	1.0000	.6785	.4871	.7954	-.0195
	(43)	(42)	(42)	(43)	(43)	(0)	(43)	(43)	(43)	(42)
	S= .189	S= .053	S= .451	S= .001	S= .001	S= .001	S= .001	S= .001	S= .001	S= .451
VAR308	.0268	-.1478	-.0589	.7028	.2762	.6785	1.0000	.0996	.4934	-.0589
	(43)	(42)	(42)	(43)	(43)	(43)	(0)	(43)	(43)	(42)
	S= .432	S= .175	S= .356	S= .001	S= .037	S= .001	S= .001	S= .263	S= .001	S= .356
VAR309	-.0627	-.2958	-.2018	.2949	.4969	.4871	.0996	1.0000	.5360	-.2018
	(43)	(42)	(42)	(43)	(43)	(43)	(43)	(0)	(43)	(42)
	S= .345	S= .029	S= .100	S= .027	S= .001	S= .001	S= .263	S= .001	S= .001	S= .100
VAR310	-.0055	-.2571	-.1399	.7295	.4587	.7954	.8934	.5360	1.0000	-.1399
	(43)	(42)	(42)	(43)	(43)	(43)	(43)	(43)	(0)	(42)
	S= .486	S= .050	S= .188	S= .001	S= .001	S= .001	S= .001	S= .001	S= .001	S= .188
VAR311	.8490	.5643	1.0000	-.0713	.0648	-.0195	-.0589	-.2018	-.1399	1.0000
	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(42)	(0)
	S= .001	S= .001	S= .001	S= .327	S= .342	S= .451	S= .356	S= .100	S= .188	S= .001
VAR312	-.0055	-.2571	-.1399	.7295	.4587	.7954	.8934	.5360	99.0000	-.1399
	(43)	(42)	(42)	(43)	(43)	(43)	(43)	(43)	(43)	(42)
	S= .486	S= .050	S= .188	S= .001	S= .001	S= .001	S= .001	S= .001	S******	S= .188

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PEARSON CORRELATION COEFFICIENTS

	VAR302	VAR303	VAR304	VAR305	VAR306	VAR307	VAR308	VAR309	VAR310	VAR311
VAR302	1.0000 (0) S= .001	.5704 (19) S= .005	.8590 (19) S= .001	-.1880 (31) S= .156	-.2533 (31) S= .085	-.2785 (31) S= .065	.0042 (31) S= .491	-.2278 (31) S= .109	-.1366 (31) S= .232	.8590 (19) S= .001
VAR303	.5704 (19) S= .005	1.0000 (0) S= .001	.9255 (19) S= .001	-.3287 (23) S= .063	-.1678 (23) S= .222	-.3121 (23) S= .074	.0425 (23) S= .424	-.2906 (23) S= .089	-.1607 (23) S= .232	.9255 (19) S= .001
VAR304	.8590 (19) S= .001	.9255 (19) S= .001	1.0000 (0) S= .001	-.4704 (19) S= .021	-.2483 (19) S= .153	-.4326 (19) S= .032	.0243 (19) S= .461	-.2992 (19) S= .107	-.1781 (19) S= .233	99.0000 (19) S=*****
VAR305	-.1880 (31) S= .156	-.3287 (23) S= .063	-.4704 (19) S= .021	1.0000 (0) S= .001	-.0106 (41) S= .474	.7384 (41) S= .001	.4814 (41) S= .001	-.0592 (41) S= .356	.2495 (41) S= .058	-.4704 (19) S= .021
VAR306	-.2533 (31) S= .085	-.1678 (23) S= .222	-.2483 (19) S= .153	-.0106 (41) S= .474	1.0000 (0) S= .001	.6665 (41) S= .001	.1251 (41) S= .218	.7868 (41) S= .001	.5823 (41) S= .001	-.2483 (19) S= .153
VAR307	-.2785 (31) S= .065	-.3121 (23) S= .074	-.4326 (19) S= .032	.7384 (41) S= .001	.6665 (41) S= .001	1.0000 (0) S= .001	.4432 (41) S= .002	.4865 (41) S= .001	.5787 (41) S= .001	-.4326 (19) S= .032
VAR308	.0042 (31) S= .491	.0425 (23) S= .424	.0243 (19) S= .461	.4814 (41) S= .001	.1251 (41) S= .218	.4432 (41) S= .002	1.0000 (0) S= .001	.2940 (41) S= .031	.7873 (41) S= .001	.0243 (19) S= .461
VAR309	-.2278 (31) S= .109	-.2906 (23) S= .089	-.2992 (19) S= .107	-.0592 (41) S= .356	.7868 (41) S= .001	.4865 (41) S= .001	.2940 (41) S= .031	1.0000 (0) S= .001	.8208 (41) S= .001	-.2992 (19) S= .107
VAR310	-.1366 (31) S= .232	-.1607 (23) S= .232	-.1781 (19) S= .233	.2495 (41) S= .058	.5823 (41) S= .001	.5787 (41) S= .001	.7873 (41) S= .001	.8208 (41) S= .001	1.0000 (0) S= .001	-.1781 (19) S= .233
VAR311	.8590 (19) S= .001	.9255 (19) S= .001	99.0000 (19) S=*****	-.4704 (19) S= .021	-.2483 (19) S= .153	-.4326 (19) S= .032	.0243 (19) S= .461	-.2992 (19) S= .107	-.1781 (19) S= .233	1.0000 (0) S= .001
VAR312	-.1366 (31) S= .232	-.1607 (23) S= .232	-.1781 (19) S= .233	.2495 (41) S= .058	.5823 (41) S= .001	.5787 (41) S= .001	.7873 (41) S= .001	.8208 (41) S= .001	1.0000 (41) S= .001	-.1781 (19) S= .233

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